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MAXIMUM PC

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MaximumPC.com—a *Huge* Leap Forward

It seems like just last week I was writing about a new and improved MaximumPC.com. Yeah, yeah, I know: It seems like we're always announcing new site improvements. But this time is different. This time I can say we have completely overhauled the website, and it's no longer just a companion to the magazine. MaximumPC.com is now a full-fledged destination all its own, with dozens of daily news updates, plus exclusive, online-only how-to stories, in-depth features, and weekly podcasts.

And, yes, Best of the Best is back—and it's fabulous.

BOTB was never fully realized in the form it took in the magazine. In print, we didn't have the necessary space to provide the rationales for our selections, and we couldn't even run product photography. But you'll be pleased to know that our online BOTB fixes both problems: We include lots of big pictures, and each entry has a write-up, so you'll know exactly *why* we chose a particular item. Even better, we'll be updating BOTB at least twice a month (which just isn't possible in the print mag). Check out Best of the Best at www.maximumpc.com/best-of-the-best.

We've also hired a killer news team, led by our own Norman Chan. Norm's nerdhounds pretty much scour the web 24/7 in order to post the most interesting PC-focused news of the morning, noon, and night. Whether they're posting about a next-gen memory spec, Diablo III, or Dell's new ultraportable notebook, you can trust that Norm and his band of geek-hunters and nerd-gatherers are on point with dozens of can't-miss posts a day.

Seriously, readers, if you appreciate what appears in *Maximum PC* magazine, you'll find the exact same attitude and depth in our daily news updates.

But wait! *There's more.* We've also begun posting features every day of the week. From hands-on how-tos to comprehensive review roundups to in-depth tech previews, there will be no shortage of new and compelling content. And what does all this cost you? *Absolutely nothing.* Whether you're a devoted subscriber or a first-time reader, MaximumPC.com is there for you.

OK, enough about the new site—it's time to jump into our 10th anniversary issue, and all the Dream Machine goodness it holds within. This issue marks a decade of publishing, and I speak for the entire *Maximum PC* staff when I say we're looking forward to another 10 years of testing PC gear on your behalf.

Maximum PC: It's a magazine. It's a website. It's a freaking ethos.

DON'T MISS!

The Return of Radeon!
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page 66

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page 86

WRITE TO WILL Please send comments, questions, and cherry limeade to will@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Will is unable to respond personally to all queries.

THE NEWS

Opening the Airwaves

White spaces may be the means of providing free broadband nationwide —TOM EDWARDS

The FCC's 700MHz auction recently concluded with a number of telecoms bidding more than $19 billion for spectrum made available by the United States' move to digital TV. Now the FCC is considering how to use another part of the spectrum, but instead of auctioning it off, it may simply open up the spectrum for anyone to use with, essentially, any type of device. What the FCC chooses to do with this spectrum, known as white space, will greatly affect how ubiquitous broadband usage becomes and may, finally, bring broadband to underserved rural areas. However, there are concerns about its use, and groups are lining up on both sides of the debate to protect their interests.

White spaces are the gaps between broadcast television channels. But to call them white spaces is a bit of a misnomer, as they *are* being used, primarily by medical monitoring devices and wireless mics. The pro audio industry, medical device manufacturers, and television broadcasters are concerned that opening up the white spaces to unlicensed devices will cause interference with either television broadcasts or devices that currently use the spectrum

The Wireless Innovation Alliance, whose members include Google, Microsoft, Motorola, and HP, are pushing the FCC to make the white spaces similar to Wi-Fi, open to any unlicensed device. Brian Peters, spokesperson for the WIA, explains that "unlicensed use of vacant portions of the spectrum would enable innovators to develop devices that would change personal communications by enabling broadband deployment, the creation of mesh networks, municipal Wi-Fi, and myriad other breakthroughs." Google cofounder Larry Page has even described white spaces as "Wi-Fi on steroids"—by one estimate, they have the potential to deliver 80Mb/s download speeds. They are also particularly valuable because signals in this spectrum can travel great distances and move through walls and other obstacles, making them a good "last mile" solution for bringing broadband to rural areas where telecoms have been reticent to run cables.

White spaces could make mobile broadband available almost anywhere. That would be something to smile about.

[WHITE SPACES] HAVE THE POTENTIAL TO DELIVER 80Mb/s DOWNLOAD SPEEDS.

Mark Brunner, Shure's senior director for public and industry relations, has a different take. While he says that "pro audio has zero objections to providing last-mile broadband wirelessly," he's worried about the potential for interference with what he terms "incumbent uses of the spectrum." This includes such things as intercoms and wireless mics, which could be hindered in urban areas, where there's likely to be a large concentration of personal wireless devices—laptops, media players, etc.—deployed.

So far, several devices have been submitted to the FCC to test this theory, but the results have been mixed. Peters explains that "these are beta prototypes being used to collect information on the use of the vacant broadcast spectrum," and the tests are not pass-fail propositions. In order to allay the concerns of the pro audio industry, what will likely happen is that some spectrum will be set aside for wireless mic use, and spectrum-sensing technology will be included in new devices that take advantage of the white spaces. But even though the spectrum will become available in February 2009, don't expect to see any white-space-utilizing devices for some time after that. Allen Nogee, principal analyst for In-Stat, thinks that because of the complexity of the issue it will be several years before devices hit the market.

The Nielsen ratings tell only half the story of a TV show's popularity.

Torrents Take on TV

According to TorrentFreak, a blog devoted to all things BitTorrent, TV shows are the most popular content being traded via the file-sharing protocol, accounting for nearly 50 percent of downloads. By collecting data from a representative sample of BitTorrent sites, TorrentFreak found that the download numbers for popular series are closing in on Nielsen's counts. The *Lost* season finale, for example, had almost 10 million downloads, compared with 12.3 million TV viewers. Other shows consistently on the site's Top Downloads list include *Battlestar Galactica, The Daily Show,* and *The Colbert Report.* –KS

Apple to Unite GPUs?

Since the full computational power of GPUs is trapped behind proprietary APIs, Apple is gathering support for an open GPU API called OpenCL to free that potential.

Open Computing Language would provide a unified programming platform, so applications could work with graphics cards from any vendor. Today, developers writing applications must use proprietary languages such as Nvidia's CUDA or ATI's Stream for GPU-specific applications. OpenCL would let a developer exploit both platforms with a single API. Already behind OpenCL are AMD, 3Dlabs, Intel, Nvidia, ARM, Freescale, and others. Notably absent, however, is Microsoft. –GU

MaximumPC.com Relaunches!

Sporting a host of new features, including expanded news coverage, a detailed Best of the Best section, and editor liveblogs, MaximumPC.com is your one-stop source for all things tech. –TE

Flash in the Pan

Flash memory could become the dominant form of mass storage, replacing magnetic and optical media for many purposes. Although flash retains data without requiring power, the memory cells don't retain their charges forever. Eventually, the charges dissipate and the bits fade away. Will our data be a flash in the pan?

Consider the trends. USB thumb drives are commonplace, and solid-state drives (SSDs) are appearing in subnotebook computers like the Asus Eee PC and Macintosh Air. SSDs are still too expensive to replace conventional drives in desktop PCs, but some hard drives use small amounts of flash to store startup data, which shortens boot times.

Flash already rules in consumer electronics. Lately, I've seen 2GB memory cards for $8. In my 10.2-megapixel DSLR, a 2GB card stores 264 pictures in highest-quality format. The cost per picture is half as much as using film—even if I don't reuse the card. And that calculation excludes the cost of developing the film. So why not use the card only once, instead of copying archives onto other media?

Unfortunately, vendors of thumb drives and memory cards are vague about data retention. Usually, they estimate 10 to 20 years. Actually, the data can last much longer.

Research shows that some cells in every flash chip lose their charge relatively quickly. The remaining cells stay charged for decades. Eventually, the number of cells losing charges rises again, until all data is lost.

Heat speeds up the process. Manufacturers can produce long-living flash chips by baking them at high temperatures (up to 482 F) for long periods (up to three weeks) to kill off the "weak" cells, leaving only the "strong" ones. Afterward, accelerated aging tests indicate that data retention at room temperature can exceed 1,000 years. However, it's unlikely that mass-market flash chips will get this expensive treatment.

To be safe, then, keep your flash memory cool and rewrite the data every 10 years or so. Although magnetic and optical media typically last much longer, they can fail prematurely, too. When preserving vital data, nothing beats making regular backups on multiple types of media. Sorry!

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

GEEK TESTED & APPROVED

Neural Impulse Actuator

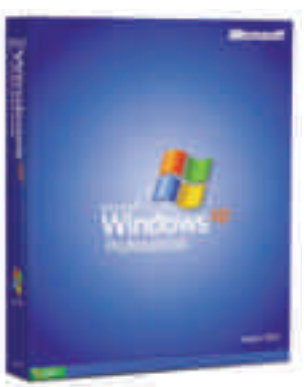
OCZ's Neural Impulse Actuator translates patterns of electrical activity in your head into keyboard commands. The shocking twist? *It works.* Using a traditional mouse to control what you see and the NIA to control movement and firing in Unreal Tournament 3, we scored our first fumbly but nonetheless breathtaking kill within five minutes of snapping the carbon-nanofiber strap to our forehead. It's a complicated, first-generation product that requires a Jedi's patience to master, but you want to kill Predator-style, don't you? –LD

Windows XP Gone, Sort Of

Manufacturers say MS is turning the screws on OS availability

As of June 30, Microsoft has pulled the plug on the retail life of the Windows XP operating system, but like a zombie that just refuses to go quietly, XP will still be offered to OEM manufacturers through January 31, 2009.

According to Dell, Microsoft is mandating that XP downgrades occur only on enterprise, business, and gaming machines—for the privilege, Dell will tack on an additional $20 fee to the price of the system.



Microsoft denies the allegations, insisting that anyone with Windows Vista Business or Ultimate is eligible for the downgrade. MS also maintains that it is not forcing retailers to limit consumers' options for downgrading based on system builds. –DM

The OS's retail days are over, but it lives on amid bickering.

Intel Customers Subpoenaed

The Federal Trade Commission's informal investigation into Intel's business practices is heating up. The FTC has subpoenaed Intel's customers, seeking more information on the chipmaker's business practices. The government agency is particularly interested in the pricing discounts Intel offers its customers. AMD has long alleged that Intel has illegally used deep pricing discounts to discourage computer makers from offering PCs using AMD CPUs.

Intel said in a statement that it has been cooperating with the FTC probe since 2006 and the subpoenas simply give the agency access to information from other parties. Intel pointed to the fierce price declines for CPUs—about 42 percent from 2000 to 2007—as a sign that there is competition. The company also took a dig at AMD by saying, "When competitors perform and execute, the market rewards them. When they falter and underperform, the market responds accordingly."

Still, the widening probe comes at a bad time. South Korea's version of the FTC recently fined Intel $25 million for similar transgressions, and the European Union last year accused Intel of antitrust violations, as well. AMD itself is continuing with its own antitrust case against Intel. –GU

GAME THEORY

Sons of Minesweeper

So is PC gaming hosed? That seems to be the case for games that a) are not massively multiplayer, b) don't have "Sims" in the title, or c) aren't played by your mom.

But it's not really as dire as all that. Mass Effect actually made it to number 2, and Sins of a Solar Empire to number 9, on the current NPD PC sales charts.

Those numbers, however, don't reflect where PC owners are really gettin' their game on: with casual games. Remember when you would say you were a PC gamer and people would say, "Yeah, me too," and you'd ask what they played, and they'd say, "Minesweeper and Solitaire." And you'd chuckle. Good times!

I still laugh to think about it, but now it's a painful, strangled (nay, *rueful*) laugh, because the Sons of Minesweeper are now *dominating the PC gaming industry*. I actually like casual games, since they load fast, fill a few minutes that might otherwise be spent strangling editors, and go away quickly.

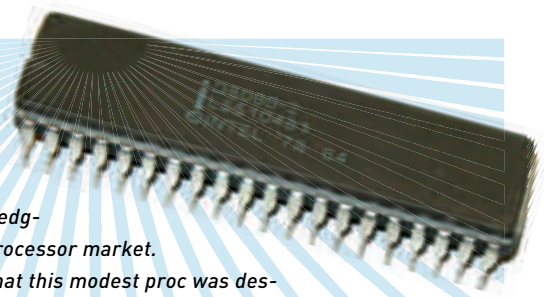
If game manufacturers are wondering why their once-loyal PC gamer hardcore fan base is finally throwing up their hands and/or certain fingers in disgust and frustration, they need only read their own boxes. Remember Crysis, the game that would knock your PC to the ground and pound its chips till it cried for mommy? Well, Crysis was a PC-only game, and its *minimum* specs were a Pentium 4 2.8GHz or comparable, 1GB RAM, and an Nvidia GeForce 6800 GT or better (Vista specs are higher). And that was for people who liked to watch slide shows. The system capable of playing Crysis at full-res with solid frame rates is currently busy running the new supercollider.

Now along toddles the PC version of Assassin's Creed, which Xbox 360 owners finished and sold back to GameStop about a year ago, and the *minimum* system specs make Crysis seem like a girly-game: Pentium dual-core 2.6GHz, 2GB RAM, 256MB DirectX 10.0 card. Recommended specs for people who want to, you know, actually *interact with the game in real time*? About twice that.

Screw that. Where's the link for Bejeweled?

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

x86 Turns 30!



Three short decades ago, Intel launched the 8086 processor to compete in the fledgling 16-bit general-purpose processor market. Little did the company know that this modest proc was destined to father the most popular CPU architecture of our time.

Since 1978, Intel and its competition have extended the basic architecture multiple times, shipped literally billions of processors, and changed the world. Happy birthday! –WS

Nokia Buys Symbian

Purchase expected to spur innovation as the OS goes open source

Nokia will donate its proprietary user interface to the Symbian Foundation.

Nokia recently agreed to purchase British mobile OS maker Symbian. The handset maker previously owned 48 percent of the company and will purchase the remaining 52 percent in a deal that's expected to be finalized in the next few months.

Symbian is used on hundreds of cell-phone models and is noted for its scalability, running everything from basic handsets to high-end, feature-rich models. As part of the deal, Nokia will create the Symbian Foundation, a nonprofit entity that will make the OS available for free to any interested party by early 2009.

The move could undermine Google's Android open-source OS, as handsets using it have been delayed. Microsoft may also stand to suffer since handset makers must pay a licensing fee to use its mobile OS. –TE

COMCAST'S NEW TACK

ISP tests protocol-agnostic traffic management

After coming under intense fire and scrutiny last year for throttling P2P traffic during peak times, broadband provider Comcast is testing a new approach to network management: protocol-agnostic bandwidth throttling. Rather than limiting the bandwidth available to, say, all BitTorrent users when network traffic is heavy, the company will target the individuals hogging the pipes. By measuring aggregate bandwidth consumption, Comcast can identify the heaviest users. During times of network congestion, these folks will experience a delay in their data requests until overall traffic has lessened.

Comcast began testing its new system in June in the Chambersburg, PA, and Warrenton, VA, markets. If all goes well, the company plans to fully roll out its new bandwidth-management scheme by the end of the year. –KS

BYTE RIGHTS

IP Rights Fairy Tale

Not very long ago, in a land not at all far away, there was a little company called Blueport. It held the copyright on a piece of software that the US Air Force liked using for logistics. Blueport protected its software with a time bomb—a bit of code that made the software self-destruct when the license expired. That date was approaching, and Blueport wanted to negotiate a new license with the USAF—and you know, get paid.

Instead, it got a bit of the ol' shock and awe. The Air Force not only didn't pay up, it paid big contractor SAIC ($2.5 million in lobbying in 2007) to reverse engineer Blueport's program and disable the time bomb. The Air Force also paid SAIC to rewrite the program, and by rewrite I mean simply cut and paste any of the original code that seemed useful.

Unsurprisingly, Blueport sued. The facts of the case were never disputed—the government not only violated copyright, it turned the DMCA out on a street corner. But the Air Force had an ace up its sleeve—the "Uh uh, no you don't" defense. It asked the judge to throw out the case based on sovereign immunity. Sovereign immunity is a legal principle that states that no one can sue the government unless the government gives them permission. In the 18th century, when the country was just a wee whippersnapper, we passed the 11th amendment to create sovereign immunity.

It doesn't have anything to do with who's right, just who's allowed to sue. The government can waive immunity, but nothing in the DMCA or copyright law says, "Yeah, OK, we'll play by these rules too."

At the same time this was occurring, the government was arresting people for DMCA violations, using trade negotiations to force DMCA laws on other nations, and generally moralizing about the whole thing a lot.

But that was that. The government cannot ever be sued for violating its own DMCA or infringing on copyright. So there are your rights when dealing with the government—a pretty grim little fairy tale.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

9 Skills Every Nerd Needs

9 EXPLAIN WHAT $E=MC^2$ MEANS TO A LIBERAL ARTS MAJOR

8 BUILD A PC—BLINDFOLDED

7 CALCULATE A PITCHER'S EARNED RUN AVERAGE

Contrary to common perception, nerds aren't averse to sports—but we do like to mix in a little math when we elevate our heart rates.

6 KNOW THE QUESTION THAT 42 IS THE ANSWER TO

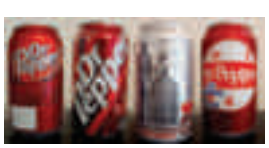
5 RECITE PI TO 23 DECIMAL PLACES

3.14159265358979323846264338327 95

4 CODE A WEBPAGE USING NOTEPAD

Dreamweaver's for sissies; you prove your skills by going old school.

3 DIFFERENTIATE BETWEEN DR. PEPPER AND MR. PIBB



2 LOCATE OGDENVILLE ON A MAP

Anyone can find North Haverbrook—finding Ogdenville takes serious nerd talent.

1 DEBATE

the relative merits of an Imperial Star Destroyer versus the USS *Enterprise*.

DEATHMATCH

Tomato vs. DD-WRT

Just because you bought your router from Linksys (or Belkin, D-Link, Netgear, or…) doesn't mean you have to use that company's firmware. Any router operating on Linux (and that's the vast majority of them) can be flashed with an open-source alternative—with Tomato and DD-WRT being two of the most popular.

The process is exactly the same as if you were installing a newer version of the manufacturer's firmware, but these alternatives deliver many, many benefits: They can expose hardware features the manufacturer chose not to enable (so you can transform an inexpensive Wi-Fi router into a second wireless access point or a bridge, for instance); offer greater control over quality-of-service (QoS) parameters, so you can prioritize VoIP and game traffic; speed up your P2P file transfers; or simply provide a more intuitive graphical user interface.

If you enjoy tweaking your PC's performance, you'll dig fine-tuning your network. The only question now is which of the two solutions is better, DD-WRT or Tomato? —MICHAEL BROWN

TOMATO V1.19
Free, www.polarcloud.com/tomato

ROUND 1

COMPATIBILITY

It doesn't matter how many cool features alternative firmware has to offer if it doesn't support your router. And that's one area where Tomato comes up short: It supports only a limited number of 802.11b/g routers, all of which are based on Broadcom chipsets. Granted, there are about a bazillion Linksys WRT54G routers in the world, but we've been recommending 802.11n Draft 2.0 routers for almost a year now.

There's a version of DD-WRT for more than 80 router models, ranging from the common-as-dirt (the aforementioned WRT54G) to the esoteric (the Meraki Mini) to the nearly brand-spankin' new (the dual-band 802.11n Linksys WRT600N).

WINNER: DD-WRT

ROUND 2

RANGE AND THROUGHPUT

Both DD-WRT and Tomato allow you to manipulate the radio on your router; you can pump up the power of its transmitter, change which antenna is used to transmit and receive, enable Afterburner (on Broadcom chipsets—just make sure Afterburner is supported and enabled on your client, too), and more. We boosted the transmit power on the Linksys WRT54GL router we used for these benchmarks from its default value of 42mW to 70mW. We also enabled Afterburner on both the router and on the Linksys WPC600N Wi-Fi adapter we used to connect our laptop to the router. Neither adjustment made much of a difference in our benchmark results.

WINNER: TIE

ROUND 3

USER INTERFACE AND DOCUMENTATION

Tomato's GUI is dead simple, but don't mistake its austerity for lack of sophistication. The interface is extremely easy to navigate, and Tomato's real-time charts and graphs can provide visual feedback on your tinkering. DD-WRT's interface is more complex, but that doesn't necessarily render it inferior to Tomato's.

Tomato's author has written an online FAQ and a Readme file accompanies the download, but the firmware itself doesn't have anything in the way of an integrated Help system. That can be a problem if you're having an issue with the router that's preventing you from getting online to find that FAQ. We prefer DD-WRT's (somewhat) context-sensitive help system, and the authors have an excellent wiki.

WINNER: DD-WRT

ROUND 4

SPECIAL FEATURES

Both Tomato and DD-WRT offer a host of special features that can greatly enhance your router's capabilities. DD-WRT, however, offers two features that Tomato doesn't: support for XLink Kai and the ability to operate up to 16 wireless networks using a single router. If you own an Xbox, PS2, or PS3, XLink Kai lets you connect your system to your router to play games over the Internet. The ability to operate multiple independent WLANs enables you to maintain a secure primary network and create a second network for wireless devices that don't support encryption.

WINNER: DD-WRT

DD-WRT V24
Free, www.dd-wrt.com

BENCHMARKS

	Linksys WRT54GL (Native)	Linksys WRT54GL (DD-WRT)	Linksys WRT54GL (Tomato)
Kitchen (Mb/s)	23.6	**24.3**	22.9
Patio (Mb/s)	23.2	**23.6**	**23.6**
Bedroom (Mb/s)	15.9	**18.7**	13.0
Media Room (Mb/s)	10.2	**11.5**	8.6
Outdoors 1 (Mb/s)	7.2	8.1	**8.6**
Outdoors 2 (Mb/s)	8.0	**8.8**	7.2

Best scores are bolded. See http://tinyurl.com/yo8qa4 for detailed benchmark criteria.

And the Winner Is...

Never considered switching from your router's factory firmware? All we can say is try it, you'll like it! Tomato and DD-WRT are both great solutions, even if Tomato is more limited in the devices it supports. Both enable interesting, useful, and valuable features that your router's manufacturer didn't think you were interested in utilizing (or maybe just thought you weren't entitled to).

We're not willing to limit ourselves to running an 802.11g network, but that's not the only reason we're recommending DD-WRT over Tomato. The ability to operate up to 16 WLANs on a single router, each with a different SSID and separate encryption (or none at all, as the case may be), is a supremely useful feature.

Our consumer advocate investigates...

Missing Monitors
Opal Office
Pricey Parts

Registry Cleaning

The Dog asked readers for their feedback regarding registry cleaners, and more specifically, RegCure, which the Dog took a hard look at in the July issue. The upshot? The handful of readers who use RegCure reported no serious issues with the application, but only one person felt that it actually improved system performance. While others thought that registry cleaners in general have nominal value as performance enhancers, some saw other reasons to use them.

Reader Eric Pullen says, "From a software/device-driver testing perspective, CCleaner has done a pretty good job of removing remnants of keys left behind by subpar software and device driver uninstallers. So CCleaner can act as a testing shortcut in certain cases, if you don't have the time or feel the need to reload an entire clean OS image. CCleaner's registry tool also works as a quick spyware checker. I had a case in which Windows Defender kept finding a malware program every so many days after deleting it, and I was able to track down the specific DLL file that was the culprit because CCleaner showed the orphan registry entry that remained after Windows Defender said it "removed" the threat. It was this registry entry that kept re-installing the malware from the suspect DLL file after a PC reboot."

What's Next, Opus Office?

I ran across a site that's selling something called Opal Office. The site, OfficeBestDeal.com, says the suite is compatible with Microsoft Office, but in reality it's just OpenOffice! You can find that out when you open the program and it says on the first line of text, "OpenOffice." Apparently, they're charging $11.95 for it. Is this even legal?

— Marion Randall

The Dog contacted OfficeBestDeal to see if the app was truly different from the free OpenOffice suite and, if so, request a copy of the source code, which the GPL license requires. A spokesman for the company named Russ responded: "According to the GPL license, we can sell OpenOffice and call it whatever name we want. We have all agreements with the OpenOffice community management team. You can find the source code at www.openoffice.org."

At least they're being honest about it. In other words, Opal Office is no different than OpenOffice, but you pay for the download. This sounded pretty hinky, so the Dog spoke with Andrew Jensen, who runs one of the user communities for OpenOffice.org. Jensen said this situation is not unheard of. Many companies take OpenOffice and sell it.

"Legally, they have the right to do it, but it bothers many people in the user community," Jensen said. Still, it's not necessarily a bad thing. Jensen said some companies that sell the product on CD actually provide a valuable resource for people who are still operating on dialup or without Internet access (provided the price is reasonable). Other vendors offer support for OpenOffice, which has some value. But many, Jensen said, simply provide a link to the OpenOffice servers and point customers to the community forums for troubleshooting.

It's not clear what level of support OfficeBestDeal offers on the download version, but it does make a CD version available for $16.90—which sounds terribly overpriced given the cost of a CD today. The Dog looked online and found the same version of OpenOffice on disc for as low as $2.95 on eBay.

So, Marion, what OfficeBestDeal is doing is legal but probably not honorable, if you ask the Dog. If the idea is simply to provide users with a copy of OpenOffice, why change the name?

SOCKET 478 BOARDS ARE DIFFICULT, BUT NOT IMPOSSIBLE, TO FIND.

Socket $478.99

I have a perfectly good Intel Pentium 4 system, but the motherboard crapped out. I've been in search of a replacement Socket 478 motherboard, but barely anyone sells them. Those who do sell them have priced them ridiculously high—higher than retail. I've come across some vendors selling an Intel 478 board for $800! What's the deal? I really need a motherboard. Please shed some light on this.

— Jitu

It's simply supply and demand at work, Jitu. Motherboards will initially debut at a high price and then slowly drop until they are no longer manufactured. As time goes on, the demand will drop, which will again decrease the price of the hardware. Prices will remain at rock bottom until the supply starts to dwindle and will then begin to inch up. An example of this phenomenon is how the price of an Intel D975PBZ motherboard has changed.

Currently, the board costs more than $230, with one vendor asking more than $300 for it. Who the hell would pay so much for obsolete equipment? For some companies and individuals it's still the best option. If a person built a server using the board and it takes a crap, the easiest way to get the rig up and running is to buy another motherboard. To that person, $300 is far cheaper than the cost of migrating all of the data to a new server. For the normal person,

such as yourself, it is wiser to buy a modern motherboard and CPU, as it gets you far more performance without paying through the nose for ancient hardware. Socket 478 boards are difficult, but not impossible, to find. If you're willing to use a VIA chipset, you can get one online for $50.

The good news is that if you wait long enough, the prices will get more reasonable—probably not what you'd hope, but at least cheaper than they are today. A really ancient Socket 423-based Intel D850GB board, for example, goes for about $65 to $85.

Opal Office is just OpenOffice with a slightly different name.

15 – 37 = 42

I purchased a 37-inch Westinghouse LVM-37W3SE LCD 1080p HDTV monitor in June 2007. A few months later, I found out that this particular model has faulty firmware that prevents it from working properly with many devices. For example, the Nvidia driver recognizes it as a different model Westinghouse 1080i monitor and refuses to set it in 1080p mode. I contacted customer support and received permission to return it. The monitor was returned in November, and it was received by Westinghouse two days later. I hadn't heard anything from them until about a month ago, when I finally made a call to find out about the RMA status. (I've been out of the country on a business trip.)

I was promised a follow-up by several people, but no one would commit to when the monitor would be sent. They basically asked me to wait until I received my product. It has now been more than seven months, and I believe I have waited long enough! Thank God my trusty 15-inch LCD is still working fine.

—Jeong Lee

The Dog contacted a Westinghouse spokesperson who said the delay is due to the limited availability of parts for the 37-inch panel. "Westinghouse Digital apologizes for the delay and is working to update any delays in its process," the spokesman said. To compensate Jeong for the lengthy wait, Westinghouse Digital said it would provide him with a new 42-inch 1080p LVM-42W2.

Decoding Creative's Drivers

I used to be able to connect my Xbox 360 to my Audigy Platinum and have it decode the 5.1 signal. However, in my new X-Fi Platinum Fatal1ty Champion soundcard, it looks like Creative disabled this feature in the drivers. Is there any way around this to get my computer to decode 5.1? This feature was supposed to be one of the card's selling points.

—Curtis Leong

Creative Labs said the loss of the feature was not intentional at all. A spokesperson explained, "It has come to our attention that, in the process of upgrading from Windows XP to Vista and installing driver updates for certain Creative soundcards, Dolby Digital and DTS decoding functionality may have been impacted for some customers. Creative has now created separate drivers that are specifically designed to re-establish these functionalities. There are two revised versions of the drivers, one for Audigy and one for X-Fi products. For Audigy products, the new driver addresses DVD audio functionality for products in which it existed before the Windows Vista upgrade (on Vista 32-bit versions only). The new Audigy driver also addresses compatibility issues for 64-bit systems that have 4GB or greater amounts of memory. Both new drivers require Windows Vista SP1. The beta version of these drivers was made available during the week of May 12. The final release version of these drivers will be made available in late July or early August."

EMAIL THE WATCHDOG If you feel you've gotten a raw deal and need assistance setting a vendor straight, email the Dog at watchdog@maximumpc.com. Please include a detailed explanation of your problem as well as any correspondence you have sent concerning the issue.

Dream Ma

achine '08

We navigate the choppy waters of hardware politics to build an uber-rig that makes no compromises

BY THE MAXIMUM PC STAFF

A Dream Machine graced the inaugural issue of *Maximum PC* back in 1998, and the tradition of building an annual no-holds-barred PC beast has continued unabated since then. True to form, this year's rig is the most audacious, most powerful dream rig to date. Equipped with no fewer than eight processing cores, four graphics cores, and five hard drives, DM2008 is probably also our most controversial build. But as Lando said, it's not our fault.

In the old days, we would just pick the very best hardware available. But those were simpler times, when parts vendors all got along and their sole mission was to provide you with badass gear. Sadly, the stakes are so high today that politics has an undue influence on hardware configurations.

The most obvious evidence of this is the ongoing war between Intel and Nvidia. Both companies try to downplay the tension, but this war of words, drivers, and marketing puts hardware enthusiasts in a pickle. We originally had our sights set on Nvidia's new GPU for this year's Dream Machine and even pre-ordered [illegible] "SLI-ready" motherboard. But the two GeForce GTX 280 cards would [illegible] our motherboard, despite its Nvidia nForce chipset.

That doesn't mean [illegible] sary Dream Machine [illegible] If anything, [illegible] nological landmines [illegible] better. Even more powerful [illegible] intriguing, as our graphics cards are [illegible] haven't even heard of them.

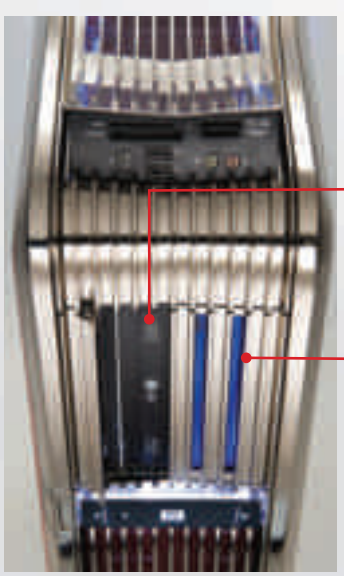
Interested? Read on to find out what's inside the world's best PC.

No Guts, No Glory

Dream Machine '08 sports some serious innards

1 **If your quad-core CPU runs out of gas when you try to simultaneously encode videos and play games, you need to see Doc Octo. These two 4GHz Core 2 Extremes have enough execution power to throw any application to the ground.**

2 Oddly, you can thank AMD's aborted QuadFX platform for Intel's Skulltrail. While AMD doesn't have the resources to continue offering insane platforms to insane enthusiasts, Intel does. The D5400XS performance-oriented, multi-proc motherboard is proof of that, and its use of Nvidia's nForce 100 chips makes it the only platform to support both SLI and CrossFire with public drivers.



3 **You might recognize this unique case as the one used to house HP's Blackbird PC. We were able to pull some strings to get the enclosure for DM. The only modifications we made to it—besides the nickel plating (more on that later)—was drilling eight holes into what was the Blackbird's tabbed-locking cooling mechanism attached to the top of the case's interior. This let us attach the water-cooling radiator to the case from the top down; it was either that, or drill super-long screws through the radiator itself—not a wise solution.**

4 The Blackbird case sports a vertical 5.25-inch bay for the optical drive. We easily slid our LG GBW-H20L Blu-ray burner into the opening using the bundled drive rails. When the drive's not in use, it's kept hidden behind a door that slides out from the front grill.

5 **The Blackbird can also accommodate two slimline optical drives, which we had no need for. So we opted to use the openings in the front of the chassis as a window to our cooling efforts by installing the reservoir there. We can now check fluid levels just by glancing at the front of our case—and watching the coolant slam against the reservoir's sides is oddly mesmerizing.**

6 The hard drives are located in five hot-swap bays, each connected to a backplane that serves as the electronics hub of the Blackbird chassis. You access it by unscrewing the side of the chassis from both the interior and exterior. This is a bit of legwork, but it's the only way you can replace a SATA cable or turn the case's various LED lights on and off.

7 **ATI's code name for its new top-tier card is R700, but its real name ought to be Butt-Kicking Benchmark Buster because these dual-GPU cards are fast. How fast? We saw more than double the performance we could get from competing cards in our Skulltrail setup.**

1
1
4
7
6

processors

Two Intel Core 2 Extreme QX9775 CPUs

One is the bomb, two are bombastic

Quad core? Nerd, *puhlease*—that's so 2008. Next year will be all about CPUs with *eight* threads. Fortunately, we're already there with a pair of Intel 3.2GHz Core 2 Extreme QX9775s. Between these most insane of Intel's Core 2 chips, we get eight cores available to the operating system at a nice round 4GHz. Is that overkill? Perhaps, as you probably won't find more than a couple dozen apps that will use all of these cores today. But let's not forget multitasking—you know, like encoding an H.264 video in the background while playing a game and also compiling some code and running a few Folding@Home sessions. You can have all that and your cake, too, with the QX9775s. It's even possible—dare we say it—that applications optimized for more than quad cores would benefit more from a pair of QX9775s than they would from Intel's upcoming Nehalem. Time will tell.

memory

8GB Corsair FB-DIMM

So much RAM your applications won't know what to do with it

Most consumers have never been exposed to "fully buffered" DIMMs, as the memory is strictly intended for workstations. To sum it up, it's a hybrid of serial and parallel interfaces that uses an advanced memory buffer in the module to let machines run in excess of 128GB of RAM. The penalty is latency and tremendous heat from the AMB, so we had to use a Corsair Dominator fan to keep the modules from spontaneously igniting.

psu

PC Power and Cooling Turbo Cool 1200

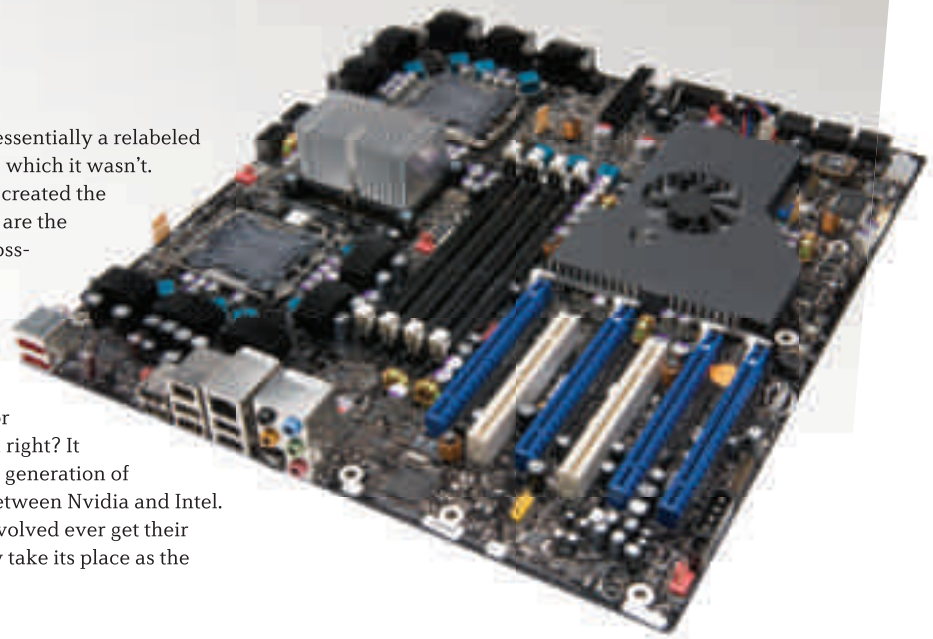
A true 1,200W PSU that makes a mockery of many '1,000-watt' units

Most 1,000-watt PSUs would crumple under the strain of our Dream Machine's loadout, so we turned to our old standby: PC Power and Cooling. Its custom-wired Turbo Cool 1200 gives us more than enough power to run all of our hardware, and with the PC Power and Cooling name behind it, we know the unit won't quit on us.

motherboard

Intel D5400XS

The mother of all, um, motherboards



Intel's original V8 S5000XVN motherboard was essentially a relabeled dual-Xeon board pitched as an enthusiast board, which it wasn't. Intel took the lessons it learned from the V8 and created the much improved Skulltrail D5400XS board. Gone are the eight FB-DIMM slots and SAS features. In are CrossFire support, overclocking features, and a more traditional, more capable (for most folks) Intel ICH9R south bridge. The cherry on top is the D5400XS's added support for SLI via the board's two nForce 100 chips. That makes it the only platform that will run either CrossFire or SLI out of the box with public drivers. Awesome, right? It was until Nvidia decided to not support its latest generation of cards on Skulltrail. Why? It's this damned war between Nvidia and Intel. And frankly, the situation sucks. If the parties involved ever get their heads out of their butts, the D5400XS will rightly take its place as the holy grail of platforms.

cooling

A Custom Water-Cooling Extravaganza!

Our home-brewed cooling kit offers maximum performance and minimal noise

The dimensions of the Blackbird chassis limited our options for water cooling this year's Dream Machine. We opted for a Black Ice Pro2 Xflow radiator, as it's one of the slimmer two-fan radiators we've tested. The reservoir is the same model from last year's Dream Machine, Danger Den's single-bay tank.

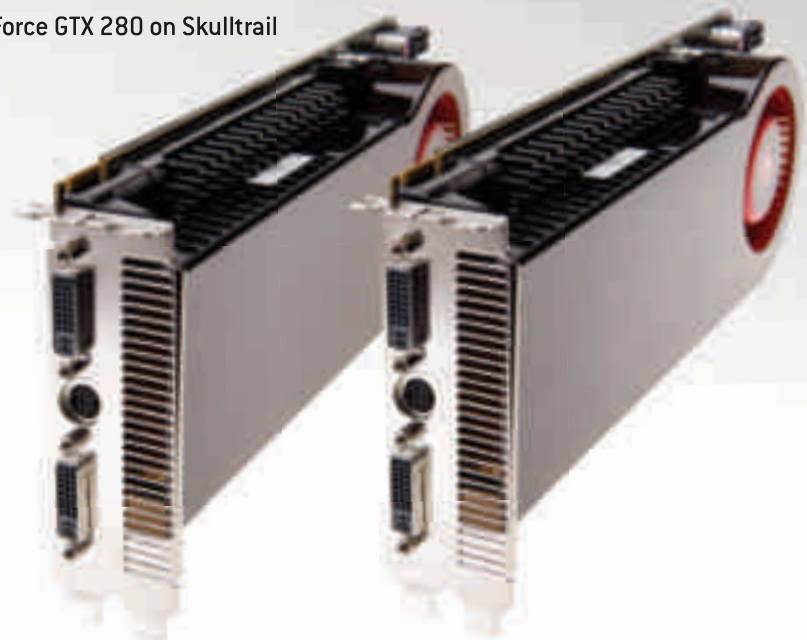
The entire assembly is outfitted with half-inch tubing and fittings. A super-powerful DD12V-D5 pump ensures a speedy flow rate for our fluid, Feser One clear UV-reactive coolant. This, in addition to our two D-TEK FuZion v2 CPU blocks, ensures that the processors will stay well within a healthy thermal range as we push this machine to its outer limits. Two silent Enermax Everest 12cm fans maintain low coolant temperatures.

videocards

Two ATI Radeon 4870 X2s

Double the performance you'd get from a GeForce GTX 280 on Skulltrail

Nvidia's decision to not support Skulltrail with its brand-new GeForce GTX 280 left us with the option of using a single GeForce GTX 280 or switching to a single-proc system that would let us use SLI. Instead, we chose option three. And that was to talk to ATI. The timing couldn't have been better because ATI was willing to share a card so secret it didn't even have a name yet. We kid you not. These dual-GPU cards were so fresh off the fab that ATI was still deciding whether to dub them Radeon HD 4870 X2 or 4970 X2. (The company settled on 4870 X2.) We only cared that we got 'em. And they're fast. In fact, on Skulltrail, they're more than twice as fast in 3DMark Vantage as a single GeForce GTX 280.



soundcard

Creative Labs Sound Blaster X-Fi Titanium

Discrete audio is making a comeback, but as far as we're concerned, it never left

Onboard audio has grown by leaps and bounds, but we're still suckers for clean, pristine-sounding discrete audio. It doesn't hurt if you get hardware acceleration as well, but even we'll admit that we have plenty of CPU cycles to spare. Creative's brand-spanking-new Sound Blaster X-Fi Titanium Fatal1ty features a redesigned DSP to natively support PCI Express. Also new is Dolby Digital encoding (finally) and a pair of optical SPDIFs.

optical drive

LG Super Multi Blue GBW-H20L

A jack of all optical trades

With LG's GBW-H20L Blu-ray burner, we don't need a separate drive to get decent DVD write speeds—as we did in last year's Dream Machine. Back then, the top Blu-ray burner was rated at a pathetic 8x for DVD+R. The GBW-H20L not only boasts the fastest BD-R speeds currently available (6x), but it's 16x DVD+R rating is also quite respectable. To get the full rundown on this drive's abilities, see the review on page 89.

speakers

Axiom Audio Audiobyte

Because audio is every bit as important as video

Speaker manufacturers have all but abandoned the PC market when it comes to surround sound, but that's not why we chose to pair Axiom Audio's Audiobyte self-powered speakers and EPZero passive subwoofer with this year's Dream Machine.

This 2.1-channel system sounds absolutely divine with games, movies, and music, delivering the sonic clarity and high resolution our ears crave. High-end audio products are never cheap, but the Audiobyte's $530 price tag is fully justified. Reviewed July 2008.

storage

Two Western Digital Velociraptors + Three Samsung D103UJs

This is the ultimate combination of performance and capacity, period

High-performance storage has split along two distinct lines: speed and size. On the one hand, there's Western Digital's Velociraptor (reviewed on page 86). It's the fastest drive we've ever tested, but it offers just 300GB of storage space. And then there's Samsung's HD103UJ (reviewed May 2008), which combines a terabyte of storage with top-of-the-line performance for its size.

It breaks our hearts to have to choose between the two… so we picked both. We're running two Revision B Velociraptors in a RAID 0 array. There's our speed. For our capacity needs, we're going with three HD103UJ drives in a RAID 5 setup. This gives us two terabytes of combined storage while offering some level of data protection should one drive fail.

case

HP Blackbird 002

Why throw the baby out with the bathwater?

We were lukewarm on the HP Blackbird PC we reviewed in our Holiday 2007 issue, but we're big fans of its one-of-a-kind chassis. The heavy aluminum case is well constructed and much of the electrical wiring for its features—such as front-panel USB and FireWire connections, a pop-up 15-in-1 card reader, and external LED lighting—is kept hidden from sight.

The hot-swap drive bays on the case's interior are a treat to work with. A 9.2cm fan runs air across all five hard drive slots. This nod to thermal management is replicated on the case's ceiling, where two 12cm fans churn the air overtop your heated motherboard components.

HP will sell 25 of its Blackbird cases on a first come, first serve basis beginning September 1. The cost is $1,000 (plus tax and shipping). To order, call 877-776-4752.

operating system

Windows Vista Ultimate x64 Edition + Windows XP Professional

Between the two OSes, we're covering all our bases

We've come down pretty hard on Windows Vista over the last 18 months, but the OS has shown major improvements in stability, reliability, and performance, especially since the launch of SP1. While we're infinitely more confident in Vista now than we were in 2007, we're still not quite ready to roll solo with the OS. That said, XP isn't perfect. Since 32-bit XP caps out at 4GB of usable memory, fully half of our Dream Machine's RAM is useless. We'll take the best of both worlds, thank you.

BEHIND THE SCENES

'Chroming' the Blackbird

The Dream Machine is all about going the extra mile—in parts and aesthetics. To give HP's Blackbird case our own unique stamp, we had the whole thing nickel plated. Computer Choppers (www.computer-choppers.com) does all the hard work and offers a selection of more than 70 plating and finish options, from chrome to copper to platinum. We chose smoked nickel for our rig, which looks a lot like chrome, only smokier and more awesome.

Before the plating is applied, the case is disassembled. Then the parts to be plated are stripped with nitric acid and immersed in a zincate solution so the metal sticks. It's a complex process that can be made more difficult depending on the quality and/or porosity of the material being plated. Waiting on the finished case was the most nail-biting aspect of building this year's Dream Machine—we didn't receive it until the day the feature was scheduled to be photographed! Luckily, HP had sent us another case, which we used to work out all the building issues in the interim.

The cost of having an entire rig plated runs from $5,000 to $10,000, depending on the plating metal.

mouse & keyboard

Microsoft Natural Ergonomic Keyboard 4000 + Logitech G5 Rev. 2

This input duo adorns the desktops of many a PC power user

When you spend as much time at a keyboard as we do, you need a plank that's as comfy as it is durable. That's why we chose the Natural Ergonomic 4000 from Microsoft for this year's Dream Machine. Likewise, your mouse needs to deliver pixel-accurate gaming performance and comfort to last through those marathon WoW sessions. The G5 does that and then some.

Keyboard reviewed March 2006. G5 mouse reviewed Holiday 2005.

display

Gateway XHD3000

You won't find a better-looking, better-performing, or better-connecting 30-inch LCD

We've seen a number of 30-inch monitors suffer from splotchy backlighting, color-tracking issues, and poor presets that introduce problems to the picture. But not the Gateway XHD3000, our big monitor of choice for nearly a year. This 2560x1600 display does it all. Its picture is vibrant, its grayscale range is impressive, and its bevy of connection options coupled with touch-sensitive interface buttons make swapping between your inputs quick and easy. Trust us, you'll *want* to hook up every device you have to this rock-star display. Reviewed December 2007.

THE FINAL TALLY...

	NAME	PRICE	URL
CPU	Two Intel Core 2 Extreme QX9775s	$3,000	www.intel.com
MEMORY	8GB Corsair FB-DIMM	$350	www.corsair.com
	Corsair Dominator Fan	$20	www.corsair.com
POWER SUPPLY	PC Power and Cooling Turbo Cool 1200	$530	www.pcpowerandcooling.com
MOTHERBOARD	Intel D5400XS	$650	www.intel.com
COOLING	Black Ice Pro2 Xflow Radiator	$40	www.dangerden.com
	Danger Den Reservoir	$30	www.dangerden.com
	DD12V-D5 Pump	$90	www.dangerden.com
	Feser One UV-Reactive Coolant	$20	www.dangerden.com
	Two D-TEK FuZion v2 CPU Blocks	$140	www.dtekcustoms.com
	Two Enermax Everest Fans	$40	www.enermaxusa.com
VIDEOCARDS	Two ATI Radeon 4870 X2s	$1,200	www.amd.com
SOUNDCARD	Creative Labs Sound Blaster X-Fi Titanium	$200	www.creative.com
OPTICAL DRIVE	LG Super Multi Blue GBW-H20L	$280	www.lge.com
SPEAKERS	Axiom Audio Audiobyte	$530	www.axiomaudio.com
STORAGE	Two Western Digital Velociraptors	$600	www.wdc.com
	Three Samsung HD103UJs	$1,200	www.samsung.com
CASE	Blackbird 002	$1,000	877-776-4752
CHROMING	Smoked Nickel Plating	$5,000	www.computer-choppers.com
OS	Windows Vista Ultimate x64 Edition	$320	www.microsoft.com
	Windows XP Professional	$225	www.microsoft.com
KEYBOARD	Microsoft Natural Ergonomic Keyboard 4000	$60	www.microsoft.com
MOUSE	Logitech G5 Rev. 2	$60	www.logitech.com
DISPLAY	Gateway XHD3000	$1,700	www.gateway.com
TOTAL		**$17,285**	

The Numbers Don't Lie

Ladies and gentlemen, we present the benchmarks

In the end, all this hardware amounts to one hell of a fast machine. And not just in theory—as in, next year when such and such comes out, this rig's power will be evident (although we do admit that some software optimizations will be needed).

In the here and now, we routinely saw performance benefits with many of today's applications. For comparison, we put Dream Machine against our standard zero-point 2.67GHz Core 2 Quad Q6700, GeForce 8800 GTX box—and DM pretty much flattened it with double- and triple-digit spreads. While a sub-3GHz quad-core box might sound quaint today, we'll remind you that our zero-point PC actually gave a new 3.5GHz Core 2 Duo gaming PC that we reviewed in August a pretty good drubbing.

Still, for an even more worthy contender, we turned to the CyberPower Gamer Ultimate SLI Quad PC that we reviewed in July. With its 4GHz Core 2 Extreme QX9770 CPU, 4GB of DDR3, and a pair of GeForce 9800 GX2 cards, the system rocked all those that came before it and we knew this mean machine would be difficult to overcome. But DM did it. At least in some tests. We saw Dream Machine rip past the CyberPower box in both Premiere Pro CS3 and ProShow Producer by 23 and 36 percent, respectively. That's nothing to turn your nose up at. In other tests, Dream Machine did well, but not spectacularly. In Photoshop CS3—not exactly the most threaded application in the world—Dream Machine scored a near tie with CyberPower, taking just two more seconds to complete our test. Since Photoshop doesn't exploit our second proc, and honestly, barely pushes a single quad-core CPU to the edge, this is about what we'd expect from PCs that operate at the same clock speed. In our MainConcept benchmark, DreamMachine was about 10 percent slower. Why? The encoder that's used in MainConcept Reference is license-limited to single-processor support. Multi-processor support is available only with the professional version, which on the Dream Machine cut the encode time in half, by the way.

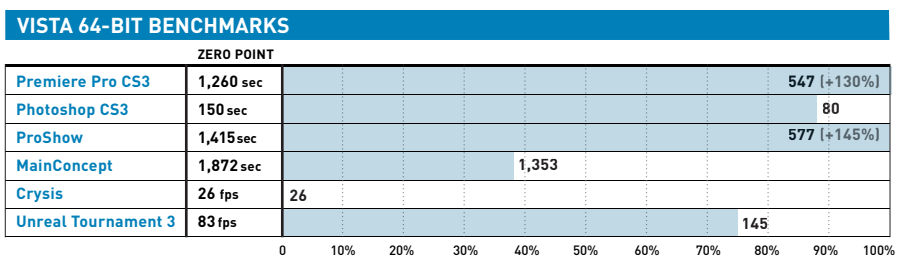
In our Unreal Tournament 3 Direct X 10 benchmark, DM's pair of Radeons didn't disappoint, cranking out 145 fps. Mind you, our normal benchmarks are designed to measure system-level performance. They're not meant for pure GPU analysis—thus, we don't run with antialiasing or massive amounts of filtering enabled. Still, we saw almost double the numbers that a pair of GeForce 8800 GTX cards could produce and 12 percent more than quad SLI cards mustered. With AA and aniso cranked up, the Radeons really start to strut their stuff. When we were still deciding what cards to use in DM, we also ran a GeForce GTX 280 in 3DMark Vantage. A single GTX 280 belts out 9,668 in the GPU tests—very impressive. But not as impressive as the 19,014 that our two Radeons put out. For all you 3D Vantage fans, Dream Machine's overall score was 20,539. Not bad.

This leads us to our most heartbreaking test: Crytek's Crysis. We expected the Radeons to excel in this benchmark, but they didn't. Why? First, as we mentioned earlier, our system benchmarks are designed to reflect normal system use, not act as GPU tests—AA is not enabled nor is tons of filtering. However, we do run at an all-out 1920x1200 resolution. That's enough to make most systems whimper. While CyberPower's Quad SLI rig spit out 55 fps, DM was chugging along at 26 fps—about the same performance we got from two GeForce 8800 GTX cards. What the frak? We got ATI on the horn and learned that the likely culprits were driver and OS optimizations—or rather, lack thereof. ATI didn't expect to make the cards public for several more months. The company has done some optimization for the X48 chipset, but Skulltrail's 5400 chipset wasn't on the top of the list. The company is still sorting out some issues with how Windows Vista handles ATI's AFR rendering. So this is what we're talking about when we say future performance will come through improved drivers.

But what choice did we have? We sure as hell weren't going to participate in this silly battle between the CPU and GPU camps. As true believers in pure PC power, we weren't going to betray that mission statement in our 10th anniversary issue—thus, this machine marks our commitment to having it all.

LEARN MORE AT MAXIMUMPC.com
http://tinyurl/43jk4a

VISTA 64-BIT BENCHMARKS



Our current desktop test bed consists of a quad-core 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard. We run two EVGA GeForce 8800 GTX cards in SLI mode, Western Digital 150GB Raptor and 500GB Caviar hard drives, an LG GGC-H20L optical drive, a Sound Blaster X-Fi soundcard, a PC Power and Cooling Silencer 750 Quad PSU, and Windows Vista Home Premium 64 bit.

The first cards to debut with ATI's new RV770 GPU are the 4870 and the 4850, representing the mid and low range, respectively. A high-performance 4870 X2 will follow.

PHOTOGRAPHY BY MARK MADEO

ATI TO NVIDIA: YOU'RE OBSOLETE

How the graphics underdog beat the odds to regain the graphics performance crown

BY WILL SMITH

There are but a few great underdog stories in any era, and to the list of today's finest, we add ATI's RV770-series GPU. ATI, much like the Red Sox, had been in a bad funk—the only way the company could compete with archrival Nvidia was by cutting the price of wannabe high-end cards to the level of Nvidia's midrange offerings. Clearly, this was not a good business model.

Then, on the eve of the GeForce GTX 280 launch, ATI unveiled a bombshell—a brand-new GPU architecture that utilizes better process technology and a more power efficient design to outperform Nvidia's gargantuan new GPU. ATI eschewed the huge, hot, monolithic GPU for a more compact but modular core. With the twin goals of decreased power consumption and more efficiency per die area, ATI now looks poised to dethrone Nvidia, and all without building a videocard that sports an aural footprint equivalent to that of a Dyson vacuum cleaner.

With this new GPU come three products: the $200 Radeon 4850, the $300 Radeon 4870, and the $600 4870 X2. While their prices vary wildly, the GPU for each is identical. Let's find out what makes it tick.

Under the Heat Spreader

ATI is kissing the giant GPU goodbye, preferring smaller, more efficient GPUs that can work in tandem on big workloads

We've walked this path before. When Intel's NetBurst architecture reached the end of its life, we were seeing the largest, hottest, most power-hungry CPUs ever, but performance wasn't scaling in line with the power and heat increases. In order to see a 10 percent performance boost, the new CPU would generate 30 percent more heat and require 30 percent more power. This was an untenable situation, so Intel and AMD quickly moved away from monolithic cores to more efficient multicore designs. If your applications can take advantage of all the CPU cores in your system, you should see significantly better performance with a much slower, cooler multicore design than you would with a similar-size single-core design running at twice the speed.

The two main GPU manufacturers are at a similar crossroads, but each chose a different direction with its new generation of GPU. Nvidia has launched its GTX 280 boards, which sport a massive, monolithic GPU design. These are among the largest chips ever put into mass production—a single GTX 280 chip is 576mm^2, features a 512-bit memory interface, and draws 236W when running full bore. By contrast, the RV770 chip that ATI is using in its new line of GPUs is just 260mm^2, features a 256-bit memory bus, and draws about 170W when running at full power. Yet despite a much smaller die, a lower power draw, and a memory bus that's half the width of the GTX 280's, the Radeon 4870 delivers about 75 percent of the speed of the GTX 280 in most of our benchmarks.

THE GPU CORE

With this generation of GPU, ATI's beginning to see the payoff from its premature move to a 55nm die size last generation. While Nvidia languishes at 65nm, ATI is packing more silicon into a smaller space and increasing efficiency at the same time. But that's not all ATI's done. The new RV770 series GPU features a complete redesign with an astounding 800 stream processors—the little silicon dynamos that handle everything from rendering soft shadows and bump maps to decoding H.264 video from Blu-ray movies.

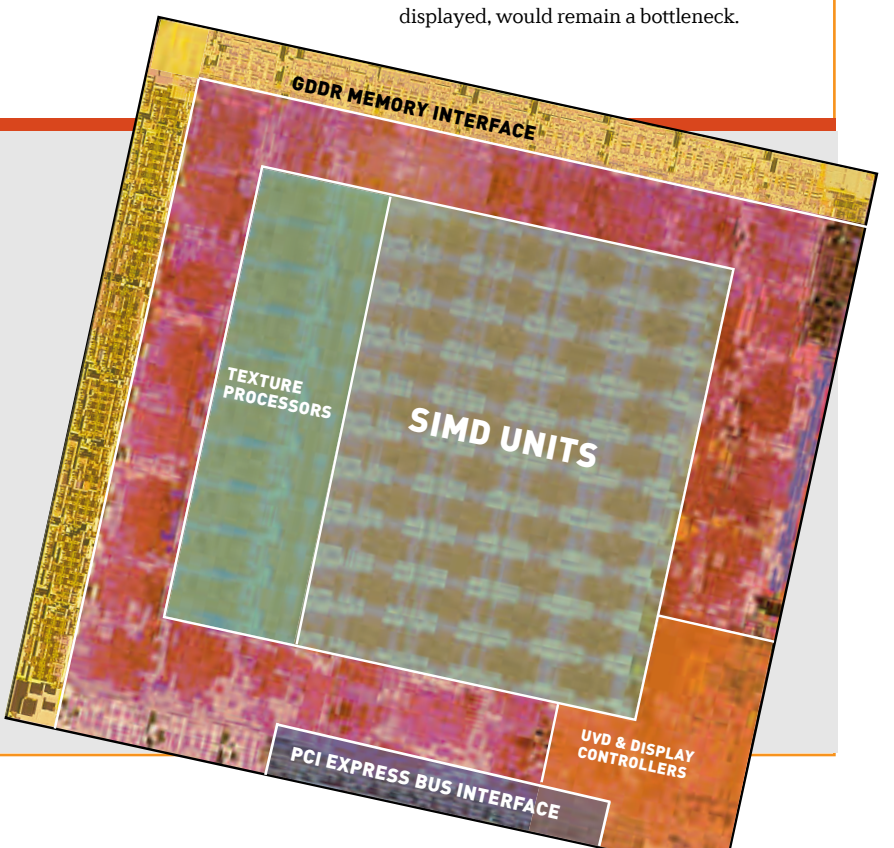
By integrating 16KB of cache with bundles of 10 stream processors and a dedicated texture unit into so-called SIMD units (which combined make up the complete shader core), ATI has juiced much better shader performance out of the overall package. The stream processors in each SIMD unit can share information using their shared memory, which makes the new shader core more efficient than previous designs. And because the stream processors pump their output directly into a dedicated texture unit, there's very little time lost between writing the output to texture memory.

The SIMD units themselves are each integrated with four texture processors in modular units, which minimizes latency and improves the performance of the RV770 design. Each SIMD connects to its four dedicated texture processors with 480GB/s of bandwidth between them. This was absolutely crucial to maintain performance; otherwise, the texture processors, which render the actual pixels that are displayed, would remain a bottleneck.

UNDER THE HOOD

The RV770 Unveiled

ATI packed the latency-sensitive silicon, such as the stream processors and the basic texturing units, in the center of the RV770 GPU. Surrounding it are the memory controllers and the L2 cache, and on the periphery of the chip rests the memory interface (GDDR5 on the 4870 and GDDR3 on the 4850), the PCI Express connection, the CrossFire controller, and the various display controllers for DVI, HDMI, VGA, and DisplayPort. And all of that is packed on a 260mm^2 55nm die.



THE MEMORY

There are two basic ways to increase memory bandwidth. You can increase the clock speed of the memory or you can transfer more data with every clock cycle by increasing the width of the memory bus. Like ATI's previous-generation GPUs, Nvidia's GTX 280 uses a 512-bit-wide memory bus. The RV770 GPU utilizes a narrower 256-bit bus, but it also supports new GDDR5 memory, which is capable of twice as many transfers per clock cycle as GDDR3. This gives ATI's GPU roughly the same memory bandwidth as the GTX 280 on a board with a less-expensive 256-bit bus and the ability to transfer more data at lower clock speeds.

What's more, GDDR5 also uses fewer pins than DDR3 to connect the memory to the board. This reduces board complexity, which is very important given the reduced space available with smaller process technology. By using a less-complex 256-bit bus and cranking the clocks up on the GDDR5 memory, ATI should be able to achieve decent memory performance without harming yields for the GPU, all while spending less per board.

While the high-end Nvidia graphics parts are running at a punishing 1100MHz and pushing an impressive 115GB/s of bandwidth, ATI's 4870 ticks along at just 900MHz but delivers the same 115GB/s. The net result is that the ATI card's memory draws less power and generates less heat, while delivering the same level of performance as the more expensive card.

Running GDDR5 memory at speeds lower than GDDR3 memory with the same bandwidth is great, but the current low-end and midrange ATI boards feature only 512MB of total card memory—half the amount Nvidia's new cards offer (the GeForce GTX 260 ships with 896MB of memory on a 448-bit interface and the GTX 280 ships with a full gigabyte). For the most part, performance doesn't seem to suffer from this shortcoming, but that could change as graphically intensive games like Far Cry 2 and Fallout 3 are released later this year.

VIDEO PLAYBACK AND ENCODING

Video decode acceleration is a crucial feature for modern GPUs. The new RV770-series GPU handles advanced Blu-ray-required features, such as picture-in-picture, on the hardware, which allows for much lower CPU utilization with supported players. In our testing, CPU utilization went up about 5 percent when we flipped on picture-in-picture playback, while there was about a 20 percent increase when using an older ATI card on the same system.

Like Nvidia, ATI has demonstrated GPU-accelerated video transcodes from MPEG-2 to H.264 video. While the demos run at an impressive clip, there's no way for us to compare the performance of the two cards. The Elements BadaBoom encoder that Nvidia uses is not compatible with ATI cards and the Cyberlink PowerDirector 7 encoder used by ATI is not compatible with Nvidia cards. Nor are the two apps' settings similar enough to elicit a meaningful comparison. This illustrates the fundamental problem with GPU-based computing today, which we'll talk about next.

STREAM PROCESSING

GPU-based computing is expected to be the answer for tasks that entail massive numbers of parallel computations, and the early apps that take advantage of GPUs, such as the Folding@Home clients, make the prospect seem quite promising. The problem, however, is that there's one GPU computing API for Nvidia's cards and a separate one for ATI's cards.

That means that anyone who writes software to harness the power of GPUs needs to write not one, but two programs—one for ATI and one for Nvidia. If the last 12 years of DirectX have taught us anything, it's that in order for hardware-accelerated *anything* to succeed, you need a common API that allows developers to write code once that works on both platforms.

We don't know whether ATI's Stream or Nvidia's CUDA is the better API. Because we're not programmers, we don't care. But we do know that the continuance of two competing standards will only hamper development of GPU-leveraged applications. ATI and Nvidia need to put aside their differences and work together to build a common API that

TWICE AS NICE

The Radeon HD 4870 X2

Two RV770s on one card? That's not crazy talk, it's the 4870 X2. We managed to get some early hands-on time with a pair of prototype 4870 X2 boards, and the results impressed us so much we included the cards in this year's Dream Machine.

So what's the story on the board? It's as if ATI jammed two 1GB Radeon 4870 cards onto a single PCB. The GPU and memory clocks are the same (750MHz and 900MHz, respectively), but the 4870 X2 has four times the memory of the single-GPU solution. Unfortunately, the card's two GPUs can't access the same frame buffer; they have to mirror their contents, so the effective total memory that applications can use is just 1GB.

In our testing, performance with a single 4870 X2 was comparable to that of two vanilla 4870 boards. A single X2 board also delivered scores that were better than those of a single GeForce GTX 280. The board we tested had power management disabled in the BIOS, so we couldn't test the noise levels or power draw.

ATI has solved some of the problems that continue to plague Nvidia's multi-GPU setups. A CrossFire setup can run multiple monitors without a problem, but there are still issues getting multiple-GPU cards running at peak efficiency, especially with some DirectX 10 games. As of this writing, the card is still a couple months from release; we'll report back when we get final silicon next month.

works on all hardware. If the two companies need a place to start, Apple pitched OpenCL, which does just that.

THE CARDS

By the time you read this, ATI will have launched both the Radeon 4850 and the Radeon 4870. Priced at $200 and $300, respectively, these cards are set to compete squarely in the midrange.

The 4850 ships with 512MB of (less-expensive) GDDR3 running at 993MHz on a 256-bit bus. The board we tested runs a 625MHz core and sports the same 800 stream processors as the more expensive 4870. The card will sell for between $200 and $250 depending on configuration and specs.

The Radeon 4870's core runs at 750MHz and the board's 512MB of GDDR5 memory runs at 900MHz on a 256-bit bus. Remember, though, the GDDR5 memory transfers four chunks of data per clock, giving it an effective memory bandwidth that's almost double that of the 4850. For $50 to $100 more, this is a good thing.

The Performance Story

Enough of this banter—let's get to the benchmarks

Does ATI's new GPU deliver 75 percent of a GeForce GTX 280's power for a fraction of the price? We went into the Lab to find out. The short answer is yes. The Radeon 4870 runs nearly as fast as a GTX 280 in most benchmarks for about 60 percent of the cost. That's pretty impressive. Running two 4870 boards together in CrossFire delivers performance that beats a single GTX 280 board for the same cash outlay. This might tempt you to pony up for a pair, but think before you leap.

Dual-card solutions are well and good in practice, but before you make the jump to two cards, you need to be aware of the pitfalls. First, adding a second card to your rig completely obviates the power and noise benefits the 4870 has over the GTX 280. Second, functionality that you may take for granted, such as multiple-monitor support, might not work with a dual-card solution. ATI only recently added dual-monitor support via its 8.2 Catalyst driver and Nvidia's SLI still does not support it. Third, new games frequently require a driver update or even a patch before they'll properly take advantage of a second card. Multiple cards are great for power users, but you need to be aware of the sacrifices involved, preferably before you whip out your credit card.

During the course of our testing, we discovered that many of these new cards were CPU-bound on our test beds in all but the most demanding games. That means that even adding a second (or a faster) videocard to your system shows very little performance improvement because the CPU can't handle its tasks fast enough to keep the GPUs occupied. We'll be updating our test bed before the next round of GPU reviews to mitigate this factor. But if your current CPU is slower than an Intel Core2 Duo X6800—a 2.93GHz dual-core Conroe—you probably won't see much benefit in games other than Crysis if you upgrade to more than one graphics card, whether it's a GTX 280, a Radeon 4870, or even a Radeon 4850.

But, we digress. The short, short verdict is that ATI's new Radeon 4850 and Radeon 4870 deliver stunning performance at an extremely compelling price. If you've been waiting to upgrade to a DirectX 10-compatible graphics card, now is the time. For less than the price of an Xbox 360, you can upgrade your GPU and get kick-ass gaming performance on most modern PCs.

BENCHMARKS

	Radeon 4870	Radeon 4870 Crossfire	Radeon 4850	Radeon 4850 Crossfire	GeForce GTX 280
Crysis (fps)	9.3	**19.9**	8.1	19.2	15.9
World in Conflict (fps)	28.0	**34.0**	31.0	**34.0**	32.0
Company of Heroes (fps)	39.6	44.6	32.7	**45.1**	32.0
3DMark06 Game 1 (fps)	34.0	**47.1**	24.4	45.5	46.0
3DMark06 Game 2 (fps)	36.7	**49.5**	29.7	48.1	45.5
3DMark Vantage Game 1 (fps)	10.7	**19.9**	8.1	13.1	15.5
3DMark Vantage Game 2 (fps)	9.0	**17.4**	7.0	10.0	11.9

Best scores are bolded. All benchmarks run at 1920x1200 with 4x AA enabled, unless otherwise specified.

A Decade of Kick Ass

Maximum PC celebrates 10 years of pure PC power

BY KATHERINE STEVENSON

From Deschutes to Penryn, from Voodoo2 to GX2, from floppy drives to SSDs, the definition of pure PC power has changed radically over the last decade, and *Maximum PC* has been there—hands-on and no holding back—helping computer enthusiasts make sense of it. In honor of those 10 eventful years, we take a look back at some of the key

moments in the magazine's history, hear from some of the editors who have been there along the way, and take a wild guess at how another 10 years might shape the computing landscape. Strap on your sneaks, folks, we're taking a walk down memory lane.

10 Things We Got Right

It's nice to look back and see that we sometimes know what we're talking about

ATHLON 64 You can call it jumping on the bandwagon, but we call it knowing a winner when we see one. We lauded the Athlon 64 with award after award and high praise for good reason: This chip kicked ass and took names for years.

CORE 2 The AMD fanboys tried to blame it on bias, but we knew—and history has proved us out—that the Core 2 marked the return of Intel.

DUAL-CORE PROCESSING It's hard to believe now, but there was resistance to the dual-core movement from folks who thought it was silly, given that applications and games weren't multithreaded. Ahem, sounds a little like the people who promote dual cores over quad cores now, doesn't it?

DIRECTX 9 DirectX has changed the face of PC gaming, and DirectX 9 is the most successful version Microsoft has ever released. With powerful support for programmable hardware, DirectX 9 delivered killer graphics at a reasonable frame rate, using hardware that was readily available at launch.

WINDOWS XP When it was released back in 2001, we bestowed XP with our highest honor—a perfect 10 verdict. Our appreciation of the OS has only grown now that we're faced with its flawed follow-up.

WATER COOLING Back in the day, people said cooling hot hardware with liquids was crazy—now it's a craze.

RIPPING CDS AND DVDS People scoffed at the time it initially took to rip music and movies, but we didn't let that stop us. We saw back then how important it was to take control of our media, whether it's to stream our library around the home (and across the Internet) or just to load our favorite movies and music onto a pocket-size media player.

DRM It was obvious to us that music shackled with copy protection would alienate consumers. Finally, that's become obvious to the record companies. Keep fighting the good fight!

HARDWARE PHYSICS Ageia talked a big game about its PhysX PPU (physics processing unit), but we couldn't get behind a card that cost $300, ate up a PCI slot, and had only novelty games supporting it. Nor could anyone else, apparently.

FIREFOX In our January 2004 Softy Awards, we called Firebird (later to become Firefox) "nothing short of revelatory," and boy has that held true. Indeed, at its release, Firefox 3 had the most downloads of any software in a 24-hour period (8 million!).

BEHIND THE BENCHMARKS

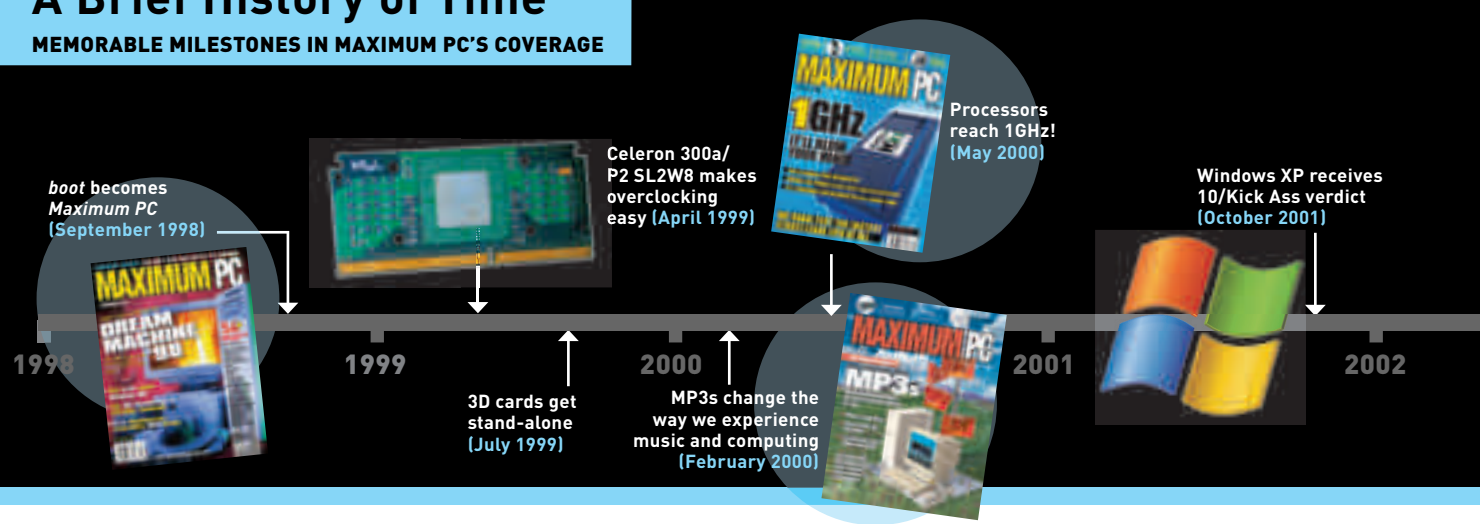
Humble Beginnings

Long before I had my job at Gizmodo, I was a *Maximum PC* intern who couldn't write a review or run a benchmark. I learned those things from Will Smith, but I also learned how important the right voice is when writing about tech. Before there were snarky blogs, there was *Maximum PC*. The point, though, wasn't to be an ass. I think. The point was to turn the trade mags on their heads and cut through the BS and jargon, to inform without being boring. You know, actually *write to people as if they were your friends*. That irreverent tone complements how technophiles feel about tech: Because it's fun thinking about how to squeeze a few more frames out of your hardware, reading and writing about such things should be fun as well. I also learned how to order lunch, lift heavy boxes, and pack and ship a PC back to a manufacturer—and make it look like it broke during transit.

Brian Lam, former intern and current editor in chief of Gizmodo

A Brief History of Time

MEMORABLE MILESTONES IN MAXIMUM PC'S COVERAGE



10 Things We Got Wrong

Yes, over the years we've made a few bad calls

VISTA We hardly gave Vista a glowing review, but given the magnitude of the botched launch—from crashing Nvidia drivers to certifying Intel's 915 chipset as Vista-capable—Microsoft got off too easy.

GEFORCE 5800 On paper, this was Nvidia's first DirectX 9 GPU. In reality, the company didn't ship a DirectX 9-capable GPU for almost a full year after ATI. To anyone who bought a GeForce 5800, we're sorry. You not only missed the full glory of Half-Life 2 but also got stuck with a bum card.

IBM 75GXP 'DEATHSTAR' It debuted as the largest, fastest IDE hard drive of its time, and we were smitten. But high failure rates for both the original models *and their replacements* left us feeling foolish.

TRUEX OPTICAL DRIVES Kenwood's CD burners were fast—when they worked. We looked past the original 40x drive's myriad problems and gave subsequent models the nod, only to learn the whole lot of them were lemons.

BTX In 2004, we believed the ATX formfactor was on its way out and that by now our motherboards would look very different. Instead, BTX has languished in obscurity.

LINUX Little did we know that the quirky OS favored by a fringe element would take off as it has, to become the trusty port in the storm of Microsoft's dominance.

PENTIUM 4 Put that coffee down, P4. Coffee's for closers. Unfortunately, who knew that the Pentium 4 would never seal the deal? Even worse, who could have seen that Intel, the king of the processor, would hit a brick wall at 1,000 mph and turn the Pentium 4 into one big dud.

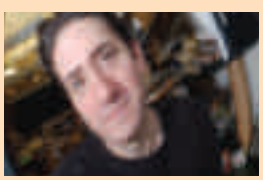
DIRECT RDRAM Kicking RDRAM under the bus seemed like the thing to do years ago, but if we could take it all back, we would. We're now convinced that RDRAM's serial interface was the right way to go, not DDR.

TABLET PC The prospect of pen-based computing seemed awesome, and Bill Gates himself was backing the project. Unfortunately, five years later, we're still waiting on the cheap, powerful Tablet PCs we were promised.

DIRECTX 10/GAMES FOR WINDOWS We feel like suckers for buying into Microsoft's hype. DirectX 10 hasn't delivered any significant innovation, and Games for Windows has turned out to be a joke.

BEHIND THE BENCHMARKS

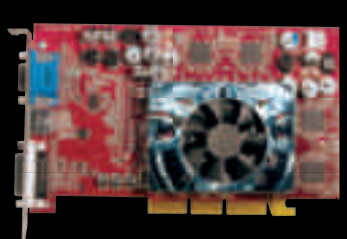
12—Not 10—Years of Kickassedness



Jon Phillips, current editorial director, former editor in chief (Oct 1999 to Dec 2003)

September 1998 marks the 10th anniversary of *Maximum PC*, but actually the 12th anniversary of our vaunted Kick Ass award. As our most devoted readers already know, the Kick Ass award first appeared in the premier issue of *boot* magazine, which we published for two years before renaming it *Maximum PC*.

In *boot*, we established much of the content and attitude that perseveres in *Maximum PC* today: our no-BS product ratings, our exacting attention to technical detail, our humor and spontaneity—and, of course, our overarching credo that if you're going to build a PC, you should always build the absolute best rig possible. In many ways, the very name of the Kick Ass award embodies much of what *Maximum PC* stands for: exuberance, enthusiasm, excess, and just plain-old best-of-class awesomeness. That's what we like in our PC hardware, and that's what we've done our best to provide in the last 120-plus issues.



Radeon 9700 Ushers in DirectX 9 programmable shaders (September 2002)

Athlon 64 spanks Intel (September 2003)

Half-Life 2 receives the only 11 verdict in the magazine's history (January 2005)

2002 — Nothing of importance happened (February 2002)

Apple quietly releases iPod (November 2002)

2003

We review Western Digital's groundbreaking 10,000rpm Raptor (May 2003)

2004

We get our first dose of Nvidia's SLI (September 2004)

2005

10 Things Maximum PC Is Older Than

1. White LEDs
2. Wi-Fi
3. The Segway
4. Bad *Star Wars* movies
5. Reality television
6. 64-bit desktop operating systems
7. Napster
8. Department of Homeland Security
9. The Nahasapeemapetilon Octuplets
10. Splenda

BEHIND THE BENCHMARKS

Cue Blooper Reel and Laugh Track

My days with *Maximum PC* go all the way back to the beginning with "Big Daddy" Dosland and the legendary "Handy Andy" Sanchez, who set the bar for editorial excellence. In those days, hazing new staffers was the norm, and my first experience was upgrading the POS desktop business-class PC that our company provided us.

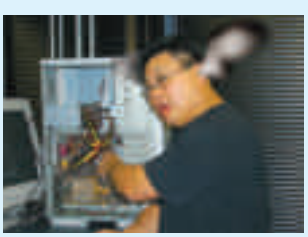
Would I get access to those oh-so-sweet Voodoo2 cards in SLI? Hell no! As the low man on the totem pole, I got a Voodoo Rush. Try to get a Rush to work with a machine that has integrated graphics that you can't disable in Windows 95!

In those days, just as today, the Maximum PC Lab was no clean room where some disconnected technician tested hardware and handed you a report. Everything was hands, eyes, and ears on. Certainly one of the most embarrassing incidents was when we ran airflow tests using a fog machine. The good news is that the test worked well, and we were able to visually record the stagnant areas in a case. The bad news is that smoke alarms can't tell the difference between smoke particles and fog particles. You can imagine the chewing out we got from the facilities manager after the entire building was evacuated and a fire truck rolled up.

Speaker testing is always a challenge—especially when the Lab was located directly next to an office full of lawyers and accountants. If you think editors are cranky, imagine a pissed-off lawyer/CPA hybrid after you've fired up Megadeth on eight Klipsch subs in parallel!

In another memorable speaker incident, former editor Josh Norem literally blew up a 5.1 speaker set doing frequency sweeps. Certain it was a fluke, we had a second set delivered and this time videotaped the test. Sure enough, we were able to capture the tweeter exploding with a puff of smoke.

Breaking hardware has always been a specialty of the *Maximum PC* staff. We could fill a freight car with all the carnage. Of course, in the old days you actually had to work at doing damage. Today, with liquid cooling, hardware gets waterboarded on a regular basis.



Gordon Mah Ung, most senior editor and staff curmudgeon

Apple Cinema Display offers 30 inches of LCD glory (February 2005)

Apple embraces x86 (January 2006)

Intel releases Core 2 processor (September 2006)

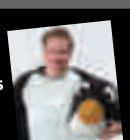
Debut of the Maximum PC No BS Podcast and the Rant of the Week (January 2007)

Gordon Mah Ung acknowledges Apple supremacy (August 2008)

Maximum PC celebrates its 10th anniversary (September 2008)

2005

EIC Will Smith tries living with Linux (February 2005)



2006

2007

Vista launches to lackluster reviews (January 2007)

We review Hitachi's 7K100—the first ever terabyte drive (July 2007)

2008

We make *Maximum PC* 30 percent more awesome! (June 2008)

2009

Coming Next Decade

Ten years from now, we might have flying cars, extraterrestrial allies, a woman president, even—and *Maximum PC* might look like this

WHITE PAPER

Photovoltaic Cells

How these cells convert the sun's energy into electrical current —MICHAEL BROWN

In one second, the nuclear fusion process taking place inside the sun produces enough energy to satisfy the needs of the earth's population for nearly 500,000 years. Photovoltaic cells are capable of capturing some of that energy and converting it into usable electricity; unfortunately, today's technology can't do this very efficiently.

French physicist Edmond Becquerel first described the photovoltaic effect in 1839. He discovered that some materials were capable of producing small amounts of electricity when exposed to sunlight. The first photovoltaic cell, however, wasn't created until 1883, and more than 70 years passed before the next major scientific advance took place, when researchers at Bell Labs developed the first crystalline silicon photovoltaic cell in 1954.

Most modern photovoltaic cells are still manufactured from silicon, the same semiconductor material used to produce GPUs, CPUs, and other integrated circuits. The majority of commercial photovoltaic cells are manufactured from crystalline silicon—either single- or poly-crystal silicon. The latter are less efficient than the former, but their lower manufacturing cost largely makes up for the conversion shortfall.

The bulk of the progress that's been made since the 1950s stems from the efficiency at which absorbed light is converted into electricity. The Bell Labs product was capable of just 4 percent efficiency; today's commercial products are approaching 20 percent efficiency.

PHOTONS CONTAIN VARYING AMOUNTS OF ENERGY, DEPENDING ON THEIR WAVELENGTHS.

THE PHOTOVOLTAIC PROCESS

A photovoltaic cell is created by sandwiching two silicon wafers: an n-type layer and a p-type layer. The n-type layer exhibits a negative electrical charge and has an excess of electrons, while the p-type layer exhibits a positive electrical charge and has a shortage of electrons. The two layers are separated by an n-p junction. The cell is then attached to a backplane, a layer of metal used to physically reinforce the cell and provide an electrical contact on its bottom. A second electrical contact is placed on the top of the cell to create an electrical circuit. The cell is then treated with an anti-reflective coating to compensate for silicon's otherwise shiny nature.

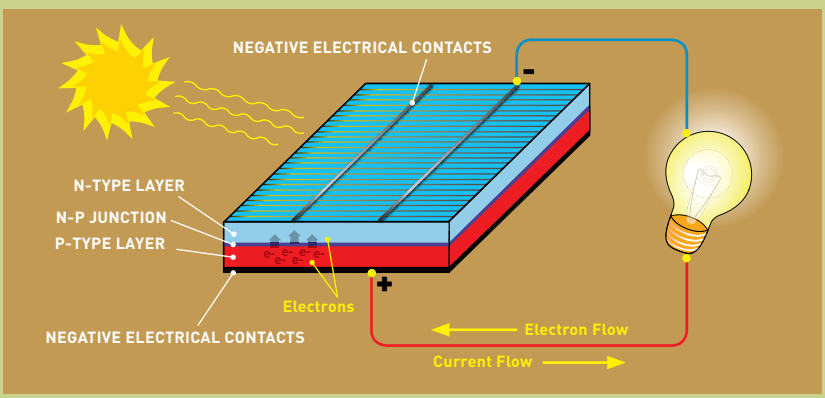
As photons—particles of light—hit the photovoltaic cell, they pass through the n-type layer and strike the p-type layer, where they are either absorbed by the silicon atoms, reflected, or pass straight through the material. Absorbed photons knock electrons loose from the silicon atoms, leaving empty "holes," which are filled by electrons further back in the circuit. The loose electrons flow through the electrical contacts on the p-type layer to the contacts on the n-type layer. This flow of electrons produces an electric current that can be drawn off and stored in a battery or used to power an electrical device.

An array of cells is electrically connected and mounted into a frame to form a photovoltaic module. A narrow metal grid is applied to the top of the module to transport electrical energy, and a sheet of glass or plastic is placed on top to protect the cells from the environment (everything from bad weather to bird droppings and stray baseballs). A group of interconnected modules is known as an array.

Photons contain varying amounts of energy, depending on their wavelength. Within the visible spectrum, red light possesses the least amount of energy while violet light has the most. The same goes for the invisible

HOW IT WORKS

A Photovoltaic Cell



Photons from the sun pass through the cell's n-type layer to strike atoms in the p-type layer, dislodging some of those atoms' electrons in the process. The freed electrons move up toward the n-layer, creating an electrical current that can be stored or service an electrical device.

spectrum: Infrared light possesses very little energy but ultraviolet light contains a great deal of it.

Most modern photovoltaic cells are capable of converting only high-energy photons into electrical current, which explains why mainstream solar panels are so inefficient. One of the most promising ideas for increasing the efficiency of solar energy is to stack cells with different properties on top of one another. This way, high-energy photons can be captured by a cell on the top of the stack, while lower-energy photons pass through to subsequent cells that are better suited to those photons' wavelengths.

AC/DC

The electrical devices in your home (appliances, computers, air conditioners, lights, and so on) operate on alternating current (AC), but a solar array produces direct current (DC). The solution is to install an inverter that converts the solar array's DC into AC. Inverters are designed to power off when there isn't enough electrical current for them to operate, e.g., at night.

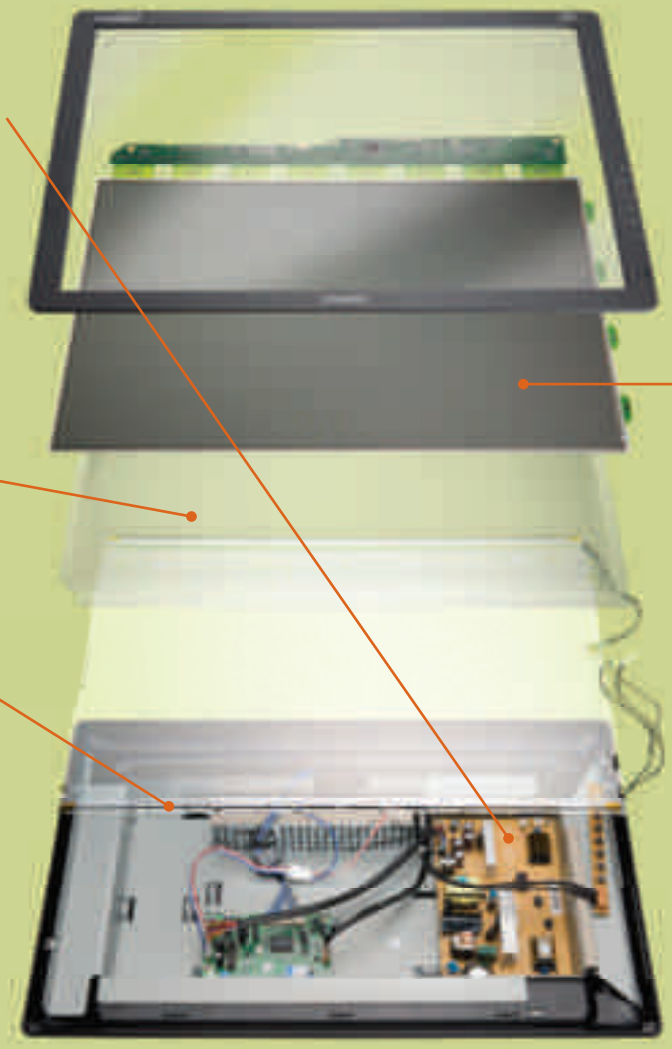
Solar panels produce the most power in the presence of direct sunlight, but they'll produce some energy on cloudy or even rainy days. They can't produce any juice at night, of course, so you'll need some means of storing the electricity that they create when the sun is shining. Batteries can provide total independence from your local electric company, enabling you to potentially live "off the grid," but this solution presents a host of environmental problems, and there's no guarantee it will provide all the energy you'll need. The more practical alternative is to tie your system into the electrical grid.

In a grid-tied system, you sell the excess energy your solar array generates to your local utility, and you buy back the electrical power you need for your home. With this method, the utility acts like an unlimited energy-storage system, giving you all the power you need whenever you need it. The inverter is connected to the meter the electric utility uses to measure your consumption, which means your meter will spin backward whenever you generate more than you consume.

For most households, the reward for going solar is more feel-good than financial: It could take a decade or longer to recoup the investment in even a moderate-size system. That situation is changing rapidly as the escalating cost of producing electricity from fossil fuels moves in inverse proportion to the cost of deriving energy from the sun.

Zalman ZM-M220W

Zalman's monitor pushes the limits of stereoscopic technology by packing three dimensions into a single LCD panel. Here's how it works!



LCD INVERTER BOARD The maze of capacitors, regulators, and transformers on the LCD inverter board spits out DC current to the display's liquid crystals. It also powers the two cold cathode tubes on the layer above it.

DIFFUSION LAYERS Three flexible diffusion sheets help scatter and spread the glow of the cathode backlight.

CATHODE TUBES Cathode tubes span the horizontal edges of a rigid piece of plastic that's patterned with thousands of small dots to aid in the backlight's diffusion.

LCD PANEL Light passes through the panel's first polarizing filter, which orients the electromagnetic waves along a specific path. This wave passes through a layer of twisted liquid crystal molecules, which rotates the wave to allow it to pass through a second polarizing filter, giving you an image. To create darkness, the molecules shift away from their helix orientation when an electrical current is applied. Thus, no electromagnetic wave rotation occurs and the second polarizing filter blocks the light.

Zalman achieves its 3D effect through stereoscopy. On the software level, Nvidia drivers display two offset images in rapid, interlaced succession. A third polarization film attached to the monitor aligns alternating stripes of phase retardation with the pixels specific to each image. Each image is converted from linear polarization waves to circular waves spinning either clockwise or counterclockwise, and circular polarized glasses worn by the viewer ensure that only one image is seen per eye. The illusion of depth created by the overlapping images elicits the sense of 3D.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Slipstream Windows XP SP3 and Vista SP1

We show you how to create no-fuss OS installation discs that contain all the hotfixes, drivers, and options you'll need —DAVID MURPHY

TIME = 45 MIN

WHAT YOU NEED

- **A WINDOWS XP PRO INSTALLATION DISC**
  $300, www.microsoft.com
- **NLITE**
  Free, www.nliteos.com

OR

- **A WINDOWS VISTA HOME PREMIUM INSTALLATION DISC**
  $240, www.microsoft.com
- **VLITE**
  Free, www.vlite.net

There's nothing we dislike more than firing up a fresh, new installation of Windows only to find a slew of hotfixes, updates, and patches awaiting us through the Windows Update mechanism. Granted, we can take some small comfort from the fact that the updating process is relatively automatic—but not so when it comes to outfitting a new OS installation with all the requisite driver packages. This list can be a doozy: videocard drivers, soundcard drivers, motherboard drivers, etc.

But you can reduce the time and effort it takes to get a fresh install into tip-top shape. By creating a slipstreamed installation disc you'll have all the patches, fixes, drivers, and options you need at the ready to be easily and automatically integrated into your next OS install—be it XP or Vista. This is especially relevant now, with new service packs available for both OSes (SP1 for Vista and SP3 for XP). If your original OS disc shipped prior to the SP release, your slipstreamed disc will give you all the newly added features. Depending on your operating system, you can make your customized installation disc using one of two handy tools, nLite or vLite. We'll show you how.

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

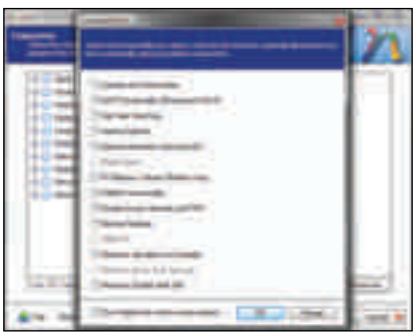
SETTING UP AN XP SLIPSTREAM DISC

1 First things first: Download nLite, then point the program to the directory where your Windows files reside. Just to clarify, that's not C:\Windows\; the program wants the location of the installation files for your OS. The easiest way to accomplish this is to put your installation CD in the drive and tell nLite to look for the files there. Once nLite finds them, it'll ask you where you want to save the installation files that will subsequently be modified by your tweaks. Make a new folder on your hard drive for this part. The program will copy over the installation files automatically.

Hit Next to be taken to the Settings menu. If you've crafted a customized nLite installation in the past, the parameters of your configuration will be listed here. Load them up and press the Next button until the program prompts you to burn a disc. Done!

If you're starting from scratch, ignore the Settings screen and click Next. You can now decide what options you want to modify to create your customized installation disc. For simplicity's sake, we're going with the default All option. But once you've played around with nLite, you might identify certain areas of your installation that you don't want to tweak. If so, you would deselect them from this options menu so they won't appear later.

To start loading XP Service Pack 3 into your Windows disc, click Next. After you've done that, go to http://tinyurl.com/4qvth5 and download the SP3 installation file. Select the executable in nLite and hit Next. Congratulations—you now have an SP3 installation disc!



TWEAKING AN XP SLIPSTREAM DISC

2 Now that SP3 is integrated, you'll be staring at nLite's Hotfixes and Updates screen. As the name suggests, this is where you can integrate any number of hotfixes or update packs into your installation—the same way you slapped SP3 onto your disc. Your best bet is to ignore this screen for now. Once you're done making the slipstreamed disc and you have SP3 up and running, make a note of what fixes pop up in Windows Update and download them from Microsoft's knowledge base. You can then integrate them into a future version of your slipstreamed disc.

The Drivers screen is a bit more important, as it allows you to integrate drivers directly into the slipstreamed disc. We wanted to pre-install the drivers for our videocard, so we grabbed the driver pack from Nvidia's website. We then extracted the files from the archival executable to a separate folder and selected this folder as the source of the drivers in nLite. When you do this, the program gives you a list of all the drivers in the directory—in our case, a single file. We selected that, clicked OK, then clicked Next.

This takes you to the Components screen, where you can strip out the unwanted side features of the operating system. If you want a safeguard against removing critical applications, click the Compatibility tab and select the different topics that represent functionality you know you need to keep.

Otherwise, start stripping. We trimmed the fat from the applications section and nuked a ton of configurations from the keyboards menu. Your final selections are up to you, but here's a helpful hint: If you don't know what something does, don't get rid of it.

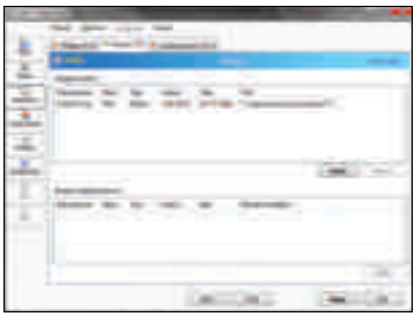
INSTALLING AN XP SLIPSTREAM DISC

3 Next, you're presented with the Unattended screen, where you can shorten and modify the actual installation process of Windows XP itself. A number of tabs are responsible for the different sections of the installation routine. We started off by entering our Windows product key into the appropriate section on the General tab and turning off System Restore (we live on the edge). We then selected the Users tab and added all the different XP accounts we typically have on our machine, making sure to assign each to the appropriate local group.

We added our naming and workgroup details under the Owner and Network ID tab, leaving the Domain name field blank. We then made sure to set the correct options for our Automatic Updates and upped our display resolution to something a bit higher than Windows's default—remember, since we've slipstreamed our videocard drivers, we should have no problem matching our monitor's native resolution. Hit Next!

We didn't change any of the settings on the following Options screen. It's for editing system options that we'd much prefer to keep as-is at this point. Once you click Next, you're presented with the final Tweaks menu. These are registry edits that control operating system-level functionality, the kinds of things you typically play with immediately after installing Windows. We used this screen to delete unwanted desktop icons and adjust our Windows Explorer options (showing all file extensions, for example) to reflect our personal tastes.

We're not going to run through all the options—that would take several more pages. Pick what suits you and hit Next; nLite will make the changes you've specified. After hitting Next one final time, nLite will present you with the option to create an image of your installation or burn it to rewriteable media directly. Make sure you hit the Make ISO or Burn button to do so—don't just hit Next!



SETTING UP A VISTA SLIPSTREAM DISC

1 Creating a Vista slipstream disc is much like creating one for XP. Download and fire up vLite, place your Vista disc in your optical drive, and select it as the source of your installation files. Once vLite has copied the files to a new location on your hard drive, click Next. The following screen lets you pick what you want to modify on the disc. We want to merge SP1 into the installation files, so click that option. But note that you have to do this *before* you run any tweaks or secondary modifications—this procedural matter is important enough that the program actually grays out any other customization options.

Click Next and you'll be prompted to select the location of the SP1 executable (you can download it at http://tinyurl.com/2pj24b). Once you've done that, the program will automatically integrate the update into the Vista installation files. After 60 to 90 minutes of activity, you'll have a slipstreamed Vista SP1 disc. And now you can begin to tweak it!

Click the Tasks tab and select all five boxes of optional tweaking pages, then click Next. The following Integration page is just like the one we described for nLite: You use the Hotfixes tab to add in any supplemental patches you've downloaded, the Drivers tab to include the latest drivers for your peripherals, and the new Language Pack page to—you guessed it—add additional language packs to the slipstreamed disc. Whatever you choose to do, you have to click the "enable" box before you start—the Insert option will be grayed out until you do so. When you're done, hit Next.

TWEAKING AND BURNING A VISTA SLIPSTREAM DISC

2 In the Components window, you're able to set the options you know you'll be running in Vista, just so you don't accidentally remove them with your component tweaking. Other than that, this process is exactly the same as it was for nLite. Go through the list of options and click those you're sure you want to remove from the installation disc: Perhaps you don't need Accessibility options, hate Vista's built-in games, or want to nuke all the operating system's multimedia functionality and install your own programs later. Once you've made your modifications, click Next.

The following Tweaks page gives you the chance to modify some of Vista's more annoying features before you install the OS. The first thing *we* did was flip off the relentlessly nagging UAC option. We also adjusted our power scheme to high performance and tweaked our Explorer settings to our liking. We ended up ignoring the Services section, as there was nothing we felt needed editing—or rather, nothing we felt comfortable turning on or off. Tweak away and hit Next—you're almost done!

Since we're only testing a Vista slipstream disc, we opted to skip entering our product key on the Unattended Setup options page. But we did choose to accept the EULA and we made edits to the various name and network location options. And that's it! Click Accept and select the imaging technique you want to use. The Rebuild One option saves you a ton of space, but you only get the tweaked operating system you selected in the beginning of the process. Rebuild All places all Vista versions on the disc, even the ones you haven't tweaked the options for.

Make your choice: Burn or create an image of your slipstreamed disc, and you're good to go!

This month the Doctor tackles...

- Soundcards
- RAID Arrays
- Booting Issues

Can You Hear Me Now?

I just put together a new PC with the following parts: an E2160 processor overclocked to 3GHz, an MSI P6N Diamond motherboard, 4GB of PC6400 Patriot Extreme memory, two 8800 GT videocards in SLI, and an Antec TruePower 550W power supply. I'm running both Vista 32-bit and XP 64-bit. The machine was originally running on an ASRock Penryn 1600 motherboard.

My problem first occurred when I was playing Crysis—suddenly, the main character's voice disappeared. I had an X-Fi Fatal1ty card installed at the time, so I tried reinstalling the drivers. Still no voices. The same problem happened regardless of what operating system or game I was using. I switched to the motherboard's built-in sound, same problem. I switched motherboards to the MSI, same problem. All the game's background sounds are there, and iTunes and Windows Media Player work fine.

—Tom Gonzales

Well, hopefully after you moved from your ASRock board to your MSI board you did an OS reinstall. While swapping boards doesn't always make the OS wacky, it can introduce errors and issues that can certainly hamper your troubleshooting efforts. And, of course, if you're overclocking and experiencing issues, revert to the stock clocks until you can isolate the problem.

Also check to see that you're running the latest BIOS updates for your nForce board—there have been numerous updates to address incompatibility issues with X-Fi cards. And make sure you have the latest X-Fi drivers installed from Creative's website. You may even consider uninstalling the X-Fi drivers and reinstalling them from scratch

Finally, it sounds like you could have the onboard sound and the X-Fi running simultaneously. This can cause all manner of problems. At the very least, you should disable the onboard audio when the X-Fi is installed. Since your issue is so odd, you might even consider removing the drivers for the onboard audio, as well. Finally, consider moving the X-Fi card to another PCI slot and reinstalling the drivers one last time.

Raiding the Raptors

I have a brand-new rig that sports two WD Raptors in a mirrored array. I wanted the speed of the Raptors and the convenience of a mirrored array. But I wonder if a mirrored or striped array (1+0, 0+1, or some other RAID number) using four 7,200rpm drives would be faster than the above array. And how would the price compare?

—David Thiel

The speed of two Raptor drives in a 1+0 setup crushes that of a single drive and a RAID 1 mirror array, but little tops the power of a two-Raptor RAID 0 configuration.

As a matter of fact, the Doctor's underlings have compared the speeds of various RAID configurations (November 2007). With Western Digital's Raptor drives, we found that a four-drive 1+0 setup will outperform a two-drive mirrored array any day of the week. However, since a 1+0 setup requires twice as many drives as a mirrored array, it will cost twice as much to create.

As for whether four cheaper drives in a 1+0 setup would outperform a mirrored Raptor array, it's certainly within the realm of possibility. A mirrored array of drives doesn't offer a gigantic performance increase over just a single drive. There's an increase, yes, but nowhere near what a striped array offers.

Given that you can now purchase drives that are both larger and cheaper than Western Digital's Raptor, the Doctor thinks your best choice is to invest in cheaper drives and create a 1+0 array.

Pop-Up Problem

I am currently running Windows XP Pro. Every

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

time I start my computer, the first thing that appears on my desktop is a pop-up error screen. It's a rectangular box with "system.exe -Application Error" at the top. On the bottom of the window is a red circle with a white X through it and this message: "The application failed to initialize properly (0xc0000022). Click OK to terminate the application." I don't know what this means.

—Evan Jones

Get your surgical mask: System.exe sounds like malware to the Doctor. At worst, it's a virus. While it's certainly possible that you've installed something that uses the executable to launch the application, the Doctor can point to a number of scenarios in which this file name is the basis for trouble.

To assess the situation, grab the free ClamWin antivirus program (www.clamwin.com). Install it, then restart your computer and repeatedly hit the F8 key during your BIOS loading process. You'll want to pick Safe Mode as the operating system environment. Once your desktop loads, run a full scan with ClamWin. (If you are already running an antivirus program, you'll want to disable it before running ClamWin.) If system.exe is a virus, as the Doc suspects it is, this will fix your problem.

If not, grab AutoRuns (http://tinyurl.com/39338j). This free program will show you a complete list of everything that fires up when you boot into your operating system. Find the first program that references "system.exe" and uncheck it. Then restart your computer—if this fixes the issue, go back to the program and delete the "system.exe" entry entirely. If not, add the checkmark back and repeat the process for other applications that use the file.

The Cloning Wars

I'm trying to upgrade my boot disc drive, which uses XP as the OS. I'd failed twice and then turned to Norton Ghost 12 to copy my C drive to my new disc. During the clone, everything seemed to be working until about 70 percent of the way through the procedure. At that point, a message appeared stating that my computer was trying to communicate with Microsoft. After about two minutes another message appeared stating that the attempt to communicate failed. Then the computer crashed.

I had some difficulty rebooting and then found that XP failed to recognize the new disc drive. It took me some time to figure out that this drive had to be reformatted. I've upgraded discs before but never encountered difficulties like this. I called Microsoft and they suggested I buy a copy of Vista and rebuild from scratch. I don't want to do this. Am I missing something?

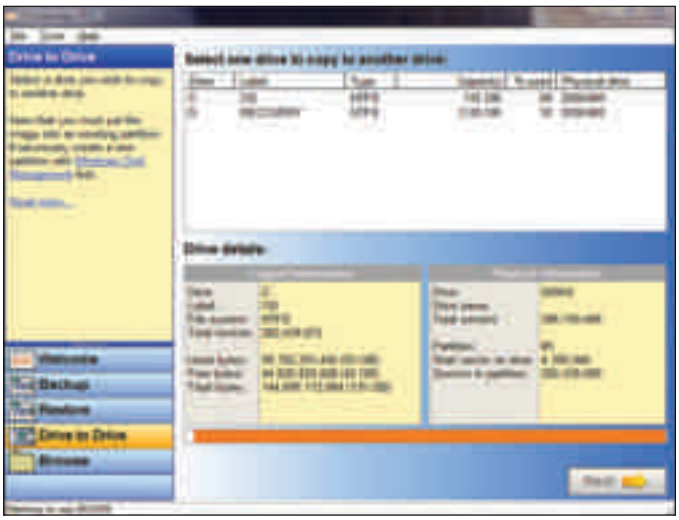
—Marvin Burke

I CALLED MICROSOFT AND THEY SUGGESTED I BUY A COPY OF VISTA AND REBUILD FROM SCRATCH.

Obviously, Windows is interrupting your clone procedure. It's surprising that the operating system is crashing entirely. If this happens repeatedly, you should back up your critical files (documents, saved games, etc.) and reinstall Windows XP.

If not, the Doctor has a solution for your cloning procedure. Ditch Ghost and pick up the Ultimate Boot CD for Windows (www.ubcd4win.com). Put it in your optical drive and boot off the CD. Once the UI fires up, find the included DriveImage XML program and use it to clone one drive to the other. The procedure should complete without Windows bothering you, given that you're running the entire operation off a bootable CD.

Ghost used to give you the option to make such a CD. You could run Ghost outside of the Windows environment yet still accomplish the same tasks as if you were in the operating system: backups, restores, clones, etc. Alas, those days are behind us.



Running DriveImage XML on a custom Windows boot disk is a great alternative to using Norton Ghost.

SECOND OPINION

Capturing DVR Video

Regarding the question about copying content from a Comcast DVR drive (June 2008), there is actually a way to capture video from the FireWire port of most cable-company-supplied DVRs. The process is a little complicated but shouldn't be too hard for most *Maximum PC* readers. The complete instructions can be found at http://tinyurl.com/hftpf.

Also, I know it says in bold that the process can only be used to capture "live TV," but that's not 100 percent true. Some DVRs, depending on the cable-company-installed software, will actually output recorded programs to the FireWire port as well. Discovering if it works for you is a matter of trial and error. –DAN HADDIX

REVIEWS

Tested. Reviewed. Verdictized

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- POLAROID PRINTER
- LINKSYS WRT160N N ROUTER
- HAWKING NETWORK ADAPTER
- STEELSERIES 7G KEYBOARD
- ASTRO A40 GAMING HEADSET
- BE0S EXTERNAL BURNER

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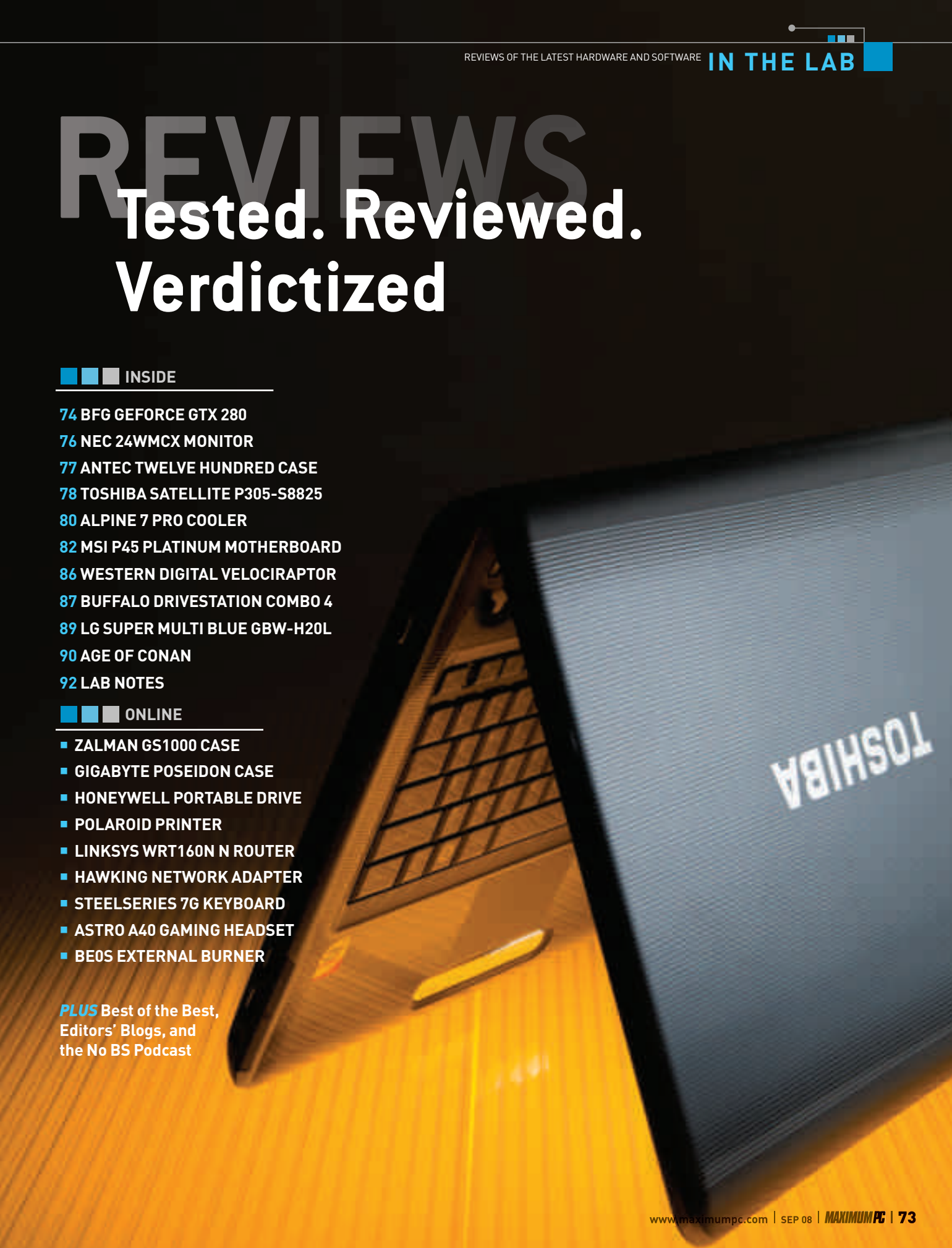


BFG GeForce GTX 280 OC 1GB

The first fully cooked GeForce GTX 280 we've tested is hot stuff!

Sporting almost the same configuration as the reference design we previewed last month, BFG's GeForce GTX 280 delivers amazing performance with the second-generation DirectX 10 chipset from Nvidia. It soundly spanks ATI's new 4870, as well as all but the dual-GPU graphics solutions from the previous generation—and even against those, the GTX 280 wins all but a few benchmarks. The real question we're asking is, Do we need this much power?

Luckily for Nvidia, the answer is yes. The company's GT200 GPU, which forms the heart of the GeForce GTX 280 and 260 boards, is a great performer, despite its massive footprint and huge energy requirements. BFG overclocked the GPU core ever so slightly—it runs at 615MHz—while the GDDR3 memory ticks along at a stock 1107MHz. The GTX 280 features 240 stream processors running at 1350MHz—a touch more than double the GPU's core speed.

It's not surprising that the GTX 280 fares so well against older Nvidia cards; far more interesting is its performance compared with the new Radeon HD 4870, which streets for about half the GTX 280's $660 list price. The good news for Nvidia is that the 280 is faster across all our benchmarks than a single 4870 board. However, the ATI card delivers as much as 80 percent of the performance of the single GTX board at a much lower price. Still, despite ATI's accomplishment, the GeForce GTX 280 is the fastest single videocard you can buy today.

The GTX 280 features all the great video-processing capabilities of the 9000-series Nvidia boards—it accelerates the decode of H.264, MPEG-4, and MPEG-2 videos and supports HDCP and dual-link DVI.

Before you rush out and purchase a GTX 280 board, make sure your system supports its power requirements. This is the first single-GPU board we've tested that requires both a 6-pin and 8-pin PCI Express power connector, and you need to make sure your power supply is up to snuff. We recommend a 650W PSU to run a single card—potential SLIers will need at least a 1000W supply. You can find a list of compatible PSUs at http://tinyurl.com/2klo8h. –WILL SMITH

BENCHMARKS

	GeForce GTX 280	Radeon 4870
Crysis	**15.9**	9.3
3DMark 2006 Game 1	**46**	34
3DMark 2006 Game 2	**45.5**	36.7
Vantage Game 1	**15.5**	10.7
Vantage Game 2	**19.9**	9
Company of Heroes	**48.7**	39.6
World in Conflict	**32**	28

Best scores are bolded. Cards are tested using an Intel Core 2 Extreme running at 2.93GHz with 2GB of Corsair DDR2 memory. All benchmarks are run at 1920x1200, with 4x AA and 16x anisotropic filtering. Crysis is run at very high settings, 3DMark Vantage is run in Extreme mode.

VERDICT 9

BFG GEFORCE GTX 280 OC 1GB

+ BFG9000	– BIO FORCE GUN
Faster than previous-gen SLI in some tests. Runs Crysis in very high mode.	Hot, loud, power-hungry design may force a PSU upgrade.

$660, www.bfgtech.com

BFG's GTX 280 board is the fastest single videocard we've ever tested.

NEC 24WMCX

It's unplayable, unwatchable, and undesirable in any situation

It's a shame to test an LCD monitor that's able to create sharp whites and rich blacks, only to watch it struggle to display common color gradients. And it's downright frustrating given our benchmarking process. We first test a display's ability to produce detail in blacks and whites. And in that race, NEC's 24WMCX finishes toward the front—a noteworthy start.

But when our DisplayMate benchmark included a larger range of gray gradients, this 24-inch monitor quickly faltered. Banding and color-tracking issues plagued the 24WMCX; in fact, we can't remember testing a monitor with this severe a coloration issue.

And these deficiencies aren't limited to synthetic benchmarks. The 1920x1200-resolution display's inability to produce smooth gradient blending between lighter and darker colors was evident in high-definition digital photographs as well. Where subtle shade changes should have been apparent, the 6-bit display showed chunky patterns of discoloration.

The ugly patterns also emerged in games. We use the first moments of BioShock for our gaming test with displays, and the exact same gradient issues popped up when fog effects billowed across the screen. This was the most disastrous example of the 24WMCX's problems. Minor gradient issues also affected lighting and glows throughout the game.

We believe the monitor's color-tracking problems are also responsible for another issue: Any adjustment to the screen's contrast adds green to the picture to varying degrees. In real-world content, the issue was most apparent when the image was light in color, but we detected the color imbalance in all content.

On a positive note, NEC included a wide array of connections: DVI, VGA, HDMI, and connections for both composite and component cables. Had the company put as much care into the picture quality as it did with the video inputs, we might have had a real winner on our hands. **–DAVID MURPHY**

You can't see it in this static image, but the 24WMCX brings out noise in HD movies—single-color walls can appear to be crawling with tiny critters.

NEC 24WMCX

VERDICT 3

+ PURPLE TENTACLE	– GREEN TENTACLE
Hits dark and light extremes; includes a wonderful number of connection options.	Severe banding and coloration issues destroy any and all picture integrity.

$535, www.necvisualsystems.com

Antec Twelve Hundred

More fans, more fuss, and more frustration than your average case

You will not find a more powerful air-cooled case on the market than Antec's Twelve Hundred—not unless you strap a box fan to the side of your chassis. That's what it would take to challenge the cooling prowess of this full-tower enclosure, which features one 20cm fan on top and five 12cm fans placed throughout the interior. These six blue LED fans are attached to individual switches that allow you to tweak the strength (and sound) of each fan to suit your needs.

While the case's cooling is top-notch, not all of the Twelve Hundred's features are so thoughtfully designed. The fans' cables could stand to be longer to better utilize the case's numerous holes and attachments for cable management. And while the Twelve Hundred comes with an additional switch to turn the 20cm fan's light on and off, it would be nice if we could control all the lights at once. And the installation procedure for hard drives is overly complicated. You have to remove a grand total of 16 screws to insert a single drive—what ever happened to no-fuss rails?

The case has plenty of room on the inside—vertically. Larger graphics cards, such as Nvidia's 8800 GTX, fit inside the chassis but leave little room for stringing cables along the card's side. We would have preferred a wider case to the unusable space above the motherboard. The chassis supports three 5.25-inch devices and nine 3.5-inch drives, but we'd gladly trade two drive bays for more usable space.

We liked the Antec Nine Hundred, but we expected the Twelve Hundred to improve on its predecessor's shortcomings—such as the narrow body and overly complex drive installation. Antec has done nothing to fix these issues. We could excuse these things in the Nine Hundred because its exceptional cooling-based design impressed us greatly. We're now at the design's second iteration, and the Twelve Hundred offers little above and beyond what we've already seen. This isn't an improvement; it's a *resize*. **–DAVID MURPHY**

The Twelve Hundred's many fans are fairly quiet on their lowest settings. On their highest, you might want to tape your windows.

VERDICT 7

ANTEC TWELVE HUNDRED

+ 300	– 4400
More cooling than a wind tunnel, elegant design, USB and eSATA front-panel connectors.	A tight horizontal fit, drive installations take forever, no screwless mounting.

$210, www.antec.com

Toshiba Satellite P305-S8825

We like a good deal, but not one fraught with sacrifices

You'll want to put on white gloves before you touch the Satellite P305's fingerprint-prone surface.

Some days, we almost miss Toshiba's signature battleship gray notebook PCs—the latest look for the company's long-running Satellite series is just a bit too much. After a few hours of use, our Satellite P305-S8825 was covered with fingerprints. And that was with clean paws! If you like snacking on Pringles while surfing the web, this rig will look as hygienic as the sneeze guard at a Baskin-Robbins after a class of third-graders has visited.

Unfortunately, the P305 is a lot like Las Vegas: glitzy on the outside but a bit cheesy on the inside. For example, this rig doesn't sport Intel's latest Montevina parts (aka the Centrino 2, with a faster 1,066MHz FSB Penryn chip). That's to be expected since Montevina's been delayed—but at the very least give us the last generation of Penryn. Instead, we get the aged 65nm Core 2 Duo T5600 at 1.86GHz.

Still, the Satellite has some nice touches. Its 17-inch glossy screen is gorgeous and bright. The 320GB hard drive is ample, and the unit's USB ports are active when the notebook is in standby, so you can charge your phone or MP3 player without having to leave the notebook powered up. The nicest feature, though, may be the price. The Satellite costs just under $1,000, which takes some of the sting out of its shortcomings.

But while you may marvel at the amount of hardware—albeit old—that $1,000 gets you, the P305's performance will leave you wanting. When compared to our Asus C90s zero-point notebook, as well as all the midrange notebooks we reviewed in our August issue, the Satellite didn't win a single benchmark.

In fact, compared to the other notebooks in its price range, the P305 takes a solid pounding thanks to the 1.86GHz Core 2 Duo T5600 chip and its 667MHz front-side bus. Only the Asus F8Sn from last month's roundup, with its even slower 1.66GHz Core 2 Duo T5450, loses to the Toshiba—and only in some benchmarks. Gaming on this rig is also pretty atrocious given its ATI Mobility Radeon HD 3470. The card is certainly magnitudes better than integrated graphics, but you won't be running any recent titles at the screen's native 1440x900 resolution with the eye candy turned up.

Desktop replacement notebooks tend to be big, to support their large screens, and the look and feel of the P305 betray every inch of its bulk. But since desktop replacements rarely leave the desk, that probably won't be an issue—a good thing, too, since the battery life is nothing to brag about. During our rundown test, we were able to watch about 90 minutes of our DVD before the battery pooped out. That's comparable to the life we got from our Asus C90s with its desktop CPU and the wickedly fast and power-hungry Alienware Area-51 m15x. What's the P305's excuse? **—GORDON MAH UNG**

SPECIFICATIONS

PROCESSOR	1.86GHz Core 2 Duo T5600
RAM	3GB DDR2/667
CHIPSET	GM965
HARD DRIVE	320GB Toshiba MK3252GSX
OPTICAL	HL GSA-T40F
VIDEOCARD	ATI Mobility Radeon HD 3470

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	1,860 sec	2,520 sec (-26.2%)
Photoshop CS3	237 sec	269 sec (-11.9%)
ProShow	2,416 sec	2,779 sec (-13.1%)
MainConcept	3,498 sec	3,600 sec (-2.8%)
FEAR	14 fps	12 fps (-14.3%)
Quake 4	29.1 fps	34.4 fps

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero point notebook uses a 2.6GHz Core 2 Duo E6700, 2GB of DDR2/667 RAM, an 80GB hard drive, a GeForce Go 8600M and Windows Vista Home Premium.

VERDICT 5

TOSHIBA SATELLITE P305-S8825

+ GAFFER TAPE	− GAFFES
Vibrant and bright screen; low price.	Horrible battery life and infested with bloatware.

$950, www.toshiba.com

Alpine 7 Pro

Look no further for a gentle upgrade to your stock Intel cooler

Given its small size, we didn't expect maximum cooling performance from Arctic Cooling's Alpine 7 Pro. And while the Alpine 7 Pro doesn't set any performance records, in some situations it does match the capabilities of our cooler of choice, Thermaltake's DuOrb. Given the sheer size difference between this 9x9x3cm cooler and the, well, monstrous DuOrb, the Alpine 7's performance was a pleasant surprise.

The Alpine 7 Pro does an exceptional job of cooling when your processor is idle—it even ran head to head with the DuOrb in this capacity. Both coolers dropped the temperature of all four cores of our Q6700 to 36 C, but when we cranked up our processor to 100 percent usage rates, the Alpine 7 faltered.

As always, our burn-in test separated the lion from the lamb. The DuOrb is reasonably quiet and provides flawless cooling. The Alpine 7 Pro's attached 9.2cm fan is similarly silent—far less audible than a beastly cooling apparatus like the Zalman CNPS9700. It just doesn't cool as well. We appreciate the Alpine 7 Pro's ability to offer better cooling than a stock Intel cooler, but as we expected from the get-go, this is not a high-performance cooler.

BENCHMARKS

	Alpine 7 Pro	Thermaltake Duo Orb	Stock Cooler
Idle (C)	**36.0**	**36.0**	46.0
100% Burn (C)	66.5	**52.0**	74.0

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard.

The cooler supports the Intel LGA775 spec to a T. Prior to this, we had never tested a cooler that included all four installation prongs that Intel stock coolers have. The inclusion of these prongs eliminates the need to remove the motherboard to install the cooler. It's a welcome relief from a tiresome process that we could really do without. All air coolers that fit an LGA775 motherboard should come with a four-prong mounting system—period.

Overclockers might want to steer clear of the Alpine in favor of a bulkier cooler, but the Alpine 7 Pro's smidgen of additional cooling over a stock part and superlow price make it a fantastic value. –DAVID MURPHY

Nobody ever said that coolers have to look crazy to perform well.

VERDICT 8

ALPINE 7 PRO

+ BLACK DIAMOND	- BUNNY HILL
Very inexpensive; performs better than a stock cooler; easy to install.	Not for serious overclockers; a bit dull looking.

$17, www.arctic-cooling.com

MSI P45 Platinum

A budget mobo you can count on

We admit it, sexy chipsets such as Nvidia's nForce 790i SLI Ultra and Intel's X48 get all the ink, but in reality, most of the world runs on plain-vanilla chipsets such as Intel's new P45. And the truth is, you don't necessarily give up performance or features when you choose a middle-of-the-road board; in fact, the affordable MSI Platinum has just about everything you'd want in a motherboard.

BENCHMARKS

	MSI P45 Platinum	MSI P35 Combo DDR2
PCMark Overall	8,756	**8,826**
PCMark RAM	**5,737**	5,576
MainConcept (min:sec)	31:01	**30:50**
3DMark06 Overall	**12,735**	12,732
ScienceMark 2.0 Overall	**1,566.45**	1,510.19
ScienceMark 2.0 RAM	**7,112**	6,110
Valve Particle Test	88	**93**
UT3 (fps)	**117**	110
FEAR (fps)	245	**250**
Quake 4 (fps)	**177**	172

Best scores are bolded. We used a Core 2 Quad Q9300, 2GB of DDR2/1066 RAM, a GeForce 8800 GTX, and Windows XP Pro SP2 with both motherboards.

Let's start with the chipset: Intel's new P45 actually gives you far more features than Intel's X38 and X48 higher-end chipsets. The P45 Platinum adds PCI-E 2.0 to this mainstream chipset and is the first mobo to use the new ICH10 south bridge, which lets you shut off individual USB or SATA ports to prevent people from stealing your data. (The new south bridge was rumored to add 10Gb Ethernet, but that's not the case.)

The P45 chipset supports 1,600MHz front-side-bus CPUs—albeit unofficially; it's a moot point, however, as we don't expect to see a rash of 1,600 FSB procs for desktop use. The chipset can utilize either DDR2 or DDR3; the P45 Platinum uses DDR2. For most people that's fine. And since DDR2 is cheaper than dirt right now, it's affordable to install the maximum amount of RAM that MSI rates the board for, 16GB—twice what the P35 supports.

But enough about the chipset, what about the board? We found it to be a standard, no-nonsense MSI board without any major layout problems—although the chipset heatsink is ridiculous. It's not particularly big, but it's certainly strange looking.

The P45 Platinum runs in a dead heat with MSI's P35 DDR2/DDR3 combo board (reviewed August 2008), with the two boards swapping wins in our benchmark tests. If we had to choose between the two, though, we'd take the P45 in a heartbeat. It offers far more memory-tweaking options, higher RAM capacity, and unofficial 2GHz front-side bus support. –GORDON MAH UNG

VERDICT 9

MSI P45 PLATINUM

+ MILEY CYRUS	– BILLY RAY CYRUS
MSI update utility makes driver and BIOS updates a snap.	Temperature gauge is loud and annoying.

$190, www.msicomputer.com

It gets the job done, but this is the weirdest heat pipe we've ever seen.

Western Digital Velociraptor

We crown a new storage speed king

Don't try to pull the drive off its IcePack and install it in your notebook. The Velociraptor's power requirements will prevent it from running.

We've seen this day coming for a long time. There was no way that Western Digital was going to sit back and let other manufacturers usurp the Raptor's place at the top of the storage speed charts. Consider the rule of the speedy terabyte drives a hiccup on the timeline. The Raptor is back: upgraded, renamed, and… physically smaller.

To maximize the Velociraptor's speeds, Western Digital has shrunk the size of the hard drive to 2.5 inches. This seems counterintuitive, given that Samsung has been able to achieve a tremendous combination of speed and storage with its 3.5-inch drives. Western Digital's smaller form allows the Velociraptor to consume less power than its 3.5-inch counterparts, and the drive heads don't have to travel as far to reach the data. The downside is that these smaller platters will always trail in data/platter.

But consumers and OEM manufacturers buy Raptor drives for a single reason—and it isn't storage capacity. Given the Velociraptor's read and write speeds, its 300GB capacity is actually a bonus. The Velociraptor is twice as spacious as its Raptor predecessor and significantly faster.

We can safely crown the Velociraptor the fastest consumer-grade hard drive on the market. Its two 150GB platters spin at 10,000rpm, creating an 18 percent improvement in our PCMark test over Samsung's HD103UJ terabyte drive. In our synthetic HD Tach benchmark, the Velociraptor beat out the HD103UJ's read times by 11.6MB/s. The difference shot up to 15.6MB/s when comparing the drives' write speeds.

This Velociraptor is Western Digital's second iteration in the line, coming a scant few months after the initial launch of the product. Why the refresh? The first version of the hard drive centered the drive atop the device's IcePack mounting frame, rendering the drive impossible to use in a hotswap interface. Reps at Western Digital have told us that this first line of Velociraptor drives is scheduled for extinction. The company will phase out these drives in favor of the revision B units unless consumers clamor for the original build—an unlikely scenario.

If you want the fastest consumer-grade hard drive on the market, the Velociraptor is it, with twice the capacity of its Raptor predecessor and a 59 percent speed advantage. If we could ding Western Digital for shafting early adopters with the hotswap issue, we would. But the company's speedy fix has ensured our praise. You might be able to find a drive with a better price-per-gigabyte ratio, but certainly not one that's faster. –DAVID MURPHY

BENCHMARKS

	WD Velociraptor	WD Raptor	Samsung HD103UJ
Size	300GB	150GB	1TB
HDTach Burst (MB/s)	**249.7**	117.6	204.5
HD Tach Rdm. Access (ms)	**7.1**	8.1	13.7
HDTach Avg. Read (MB/s)	**108.4**	65.0	96.8
HDTach Avg. Write (MB/s)	**100.0**	63.0	84.4
PCMark05 Overall	**9,450**	5,956	8,014

Best scores are bolded. HD Tach version 3.0.1.0 used.

MAXIMUM PC KICK ASS!

VERDICT **9**

WESTERN DIGITAL VELOCIRAPTOR

+ SHARPTOOTH	– LITTLEFOOT
The fastest consumer-grade hard drive you can purchase, save for SSDs.	Warranty voided if you separate the drive from the IcePack.

$300, www.wdc.com

Buffalo DriveStation Combo 4

We'd certainly use all the parts of this Buffalo

Expect to see a faster 1TB edition of this device, as the increased areal density of terabyte drives offer improved speeds.

Buffalo's 500GB DriveStation Combo 4 external drive is the fastest USB drive we've ever tested, and it even holds its own on an eSATA connection. That's thanks to a propriety technology called TurboUSB that squeaks additional speeds out of the device. On Windows XP, a DriveStation connected with TurboUSB improved its synthetic read and write speeds by 20 percent (even though its burst speeds confused our benchmark) over a typical USB connection. The device's real-world speeds weren't as dramatic—a mere four percent increase—but it was an improvement nonetheless.

We didn't see any real-world performance improvement between the two modes in Windows Vista because TurboUSB is built into the operating system itself. We'd definitely use this device on XP, but it's a wash with Vista.

The DriveStation comes with Memeo AutoBackup software and a full-disk security utility that conceals your drive under 128- or 256-bit AES encryption. The latter program's lock and unlock shortcuts for the encryption mechanism are mislabeled, but we were more bothered that it accepted our password via USB but rejected it over eSATA.

Minus these quirks, the DriveStation is a fine external storage product. It's not blazing a speed trail on its eSATA connection, but it stuffs the USB pipe. **–DAVID MURPHY**

BENCHMARKS

	DriveStation Combo 4 (USB)	DriveStation Combo 4 (Turbo USB)	DriveStation Combo 4 (eSATA)	Maxtor OneTouch 4
HD Tach Burst (MB/s)	36.2	WNR*	194	35.2
HD Tach Rdm. Access (ms)	17	**16.4**	16	13.4
HD Tach Avg. Read (MB/s)	33.9	**41.7**	64.2	35
HD Tach Avg. Write (MB/s)	32	**41.1**	59.9	34.4
PCMark05 Overall	3,698	**3,833**	6,211	3,519

*Best scores for USB/TurboUSB bolded. HD Tach scores taken using version 3.0.1.0. All scores reflect Windows XP benchmarks. *Burst speeds measurements across XP and Vista produced results that were faster than USB's possible bandwidth.*

VERDICT **8**

BUFFALO DRIVESTATION COMBO 4

+ RUMP SHAKIN'	– RUMP ROAST
USB, FireWire 400, FireWire 800, and eSATA connections; TurboUSB is speedy.	Not the fastest drive on Vista; security utility comes with a few bugs.

$190, www.buffalotech.com

LG GBW-H20L

Our favorite Blu-ray drive comes with less fat and a lower price

LG makes next-gen optical seem like a viable option.

When we reviewed LG's GGW-H20L Blu-ray burner in December 2007 we applauded its superior BD-R write speeds and ability to also read HD DVD media. Now that the latter feature is irrelevant, we welcome LG's new GBW-H20L. It boasts all the same DVD and BD read and write specs as its predecessor, sans the HD DVD reader—and comes with a healthy price cut.

LG remains the only manufacturer offering 6x write speeds for BD-R media, and it's a notable distinction. Even when burning to 2x media, LG's drives are far speedier than the 4x competition at filling a BD-R disc with 22.5GB of data—taking just over 20 minutes (the 4x Lite On drive we reviewed last month took 48 minutes to complete that task!).

LG's BD burner offers a 16x DVD+R write rating. While it's shy of the 20x rating you'll find on top-end dedicated DVD drives, we're satisfied with the real-world results. When writing 4.38GB of data to a singled-layer DVD+R disc, LG's GBW-H20L took 5:43 (min:sec), compared with the Lab record time of 5:00 set by Samsung's SH-S203 DVD drive. Most Blu-ray burners we've reviewed have capped DVD+R speeds at 8x or 12x, including the Lite On drive reviewed last month, which took 7:09 to fill a single-layer DVD.

While LG's previous GGW-H20L wins the majority of our benchmarks, the GBW-H20L comes well within spitting distance of that drive. And at $280, the GBW-H20L is almost $200 less than its predecessor. We like that.

—KATHERINE STEVENSON

BENCHMARKS

	LG GBW-H20L	LG GGW-H20L	Lite On DH-4B1S
DVD Write Speed Average	12.07x	**12.09x**	8.99x
DVD Read Speed Average	9.10x	**9.24x**	9.10x
Access Time (Random/Full)	100ms/175ms	**99ms/192ms**	137ms/213ms
CPU Utilization (8x)	24%	**23%**	31%
Time to Burn 22.5GB to BD-R (min:sec)	22:16	**21:23**	48.00
Time to Burn 22.5GB to BD-RE (min:sec)	**39:35**	39:38	46:12

Best scores are bolded. All tests were conducted using the bundled software and Verbatim media. Our test bed is a Windows XP SP2 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU.

MAXIMUM PC KICK ASS!

VERDICT 9

LG SUPER MULTI BLUE GBW-H20L

+ GRANOLA	− GRANULOMA
Fastest BD-R rating on the market, speedy DVD burn times, lowest price yet.	For backup purposes an external hard drive is still a more attractive prospect.

$280, www.lge.com

During your adventures, you'll kill enough wolves, bears, crocodiles, tigers, and scorpions to make Marlin Perkins weep from his grave.

Age of Conan: Hyborian Adventures

More leather and flesh than an S&M bar

Our help was needed—again. Such is the fate of a hero. In the world of Age of Conan: Hyborian Adventures all manner of fishermen, pirates, merchants, guards, beer wenches, and assorted ne'er-do wells require assistance. This motley cast of characters imbues the game with a vibrant sense of life; we just wish that they showed even a bit of initiative and took care of some of their own problems. We were tasked with passing along loads of messages in order to drive the story forward, but in truth, we quickly lost interest in the game's narrative, as it simply took away from the game's finest achievement: its fighting system.

Eschewing a turn-based format, Conan uses a real-time combat system that allows you to take on multiple foes; icons show how strongly each part of an enemy's body is defended, and you choose attacks and combos that focus on a foe's weaknesses. Particularly effective attacks reward users with a splatter of blood across the computer screen.

While Conan's melee combat system is innovative, the rest of the game follows typical MMO conventions. You choose a race and class that falls into one of three basic categories: (tank, damage dealer, or healer) and complete a variety of missions to level up and gain ever more powerful items. While castle sieges and some quests require you to be part of a guild, it's quite possible to complete much of the game solo. This pick-up-and-play attribute adds to the game's appeal, allowing you to jump in whenever the mood strikes without having to compare schedules with a half dozen compatriots.

AGE OF CONAN

VERDICT 7

+ PEPPER MARTIN	− PEPPER SPRAY
Rich character-creation system; engaging combat.	Too many delivery missions; bugs at launch.

$50/$15 per month, www.ageofconan.com, ESRB: M

Conan launched with a variety of minor bugs and irritations, but the development team has implemented fixes in a timely manner, assuring we'll stick with the game—at least until we reach the level cap. **—TOM EDWARDS**

LAB NOTES

The Magic that Makes the Dream Machine

Thanks, Andy, Dream Machine wouldn't be the same without you

GORDON MAH UNG
SENIOR EDITOR

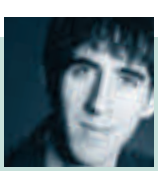
Building the Dream Machine is a lot like a night carrier landing. It takes a little skill and a little luck—all while you're surrounded by chaos. Even the saltiest of editors here sometimes don't know if the rig will work when the power button is pushed.

For 10 years though, we've had a talisman that gets us through the job: Andrew's red screwdriver. Handed down through the years from editor to editor, this Great Neck screwdriver once belonged to *Maximum PC* editor Andrew Sanchez and has been used to build every Dream Machine.

"Handy Andy" was the heart and soul of *Maximum PC*, and he unexpectedly died on February 6, 1999 at the age of 29. We like to think that when the machine POSTs and everything works, it's all thanks to Andrew's red screwdriver. That and maybe Andrew himself, watching to make sure that one more Dream Machine, one more legacy of what he believed in—fast PCs—lives on.

WILL SMITH
EDITOR-IN-CHIEF

Now that I'm back on the videocard beat, I've spent countless hours in the Lab rebuilding test beds, evaluating benchmarks, and just plain hanging with the latest, greatest videocards. The new Radeon HD 4870 X2 does something I didn't expect to see so soon—it beats the GeForce GTX 280.



DAVID MURPHY
ASSOCIATE EDITOR

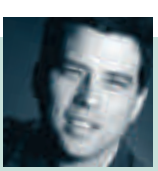
We suffered only one water-cooling leak in this year's Dream Machine, and it was quickly contained. Last year's custom kit took a day to construct… and one minute to utterly destroy our motherboard. Lesson learned: You can never be overly cautious when fluids are flowin' near electronics.

KATHERINE STEVENSON
DEPUTY EDITOR

Most of the editors started out this issue playing a lot of casual games—for work purposes, of course. While our feature story on the subject has been postponed until next month, my "testing" of Mr. Bounce hasn't slackened. I needed to verify that this game is really as fun as I first thought. It is!

NORMAN CHAN
ONLINE EDITOR

I've been kept very busy my first month here at *Maximum PC* helping to bug-fix the new website, which had a pretty kick-ass launch. Firefox 3 has also convinced me to finally abandon Internet Explorer—thank goodness I'm no longer living in 1998.

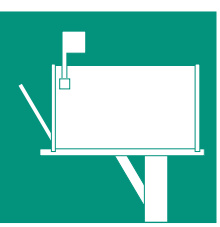


TOM EDWARDS
MANAGING EDITOR

In an effort to stave off tinnitus for perhaps another year, I used MP3Gain (http://mp3gain.sourceforge.net/) to normalize the volume level of the music I keep on my rig. The process took a while to complete, but my eardrums now rarely, if ever, bleed, so I figure it was time well spent.

We tackle tough reader questions on...

Videocard Testing
Tablet PCs
Dell's Bloated Laptops



No, We Aren't On the Take

I just read your article on the Nvidia GTX 280 (August 2008). What a joke! Don't get me wrong, I usually use Nvidia cards for gaming PCs. But you should be fair and run your benchmarks for both cards on the same exact rig! You ran the ATI card on an outdated Intel chipset and the Nvidia card on an Nvidia chipset, although it was almost as outdated. The least you could have done was use an AMD chipset for the ATI card. If you had, you would have noticed a considerable difference. I think it was more of an advertisement than an honest test. Or is money so tight you can't afford to run honest tests? If so, let me know and I will let your people use my test systems.

—David Hiss

Editor in Chief Will Smith Responds: Thanks for your letter, David. As always, we welcome constructive feedback. As for your concerns about our testing procedures, we test on two systems that are identical aside from the motherboards. Given the policies of Nvidia and ATI, we're forced to run different motherboards when we test Nvidia cards running in SLI and ATI cards running in CrossFire, as the general public doesn't have access to motherboards that run both multicard solutions. Unfortunately, this adds an additional variable to our tests, which we're certainly not happy about.

We chose the two chipsets used in our videocard tests based on their relative performance. At the time we built those systems, both chipsets fared about the same in our tests, minimizing the inequality between the two. That said, both chipsets are getting a bit long in the tooth, so we're going to revamp our videocard test beds in time for the next issue.

Less Money, Less Laptop

I'm writing to comment on your review of the Asus F8Sn (August 2008). I don't doubt the verdict you gave this configuration, but why did *Maximum PC* review the computer with the minimum specs? I've been running the same computer in a different configuration for about two months now.

I don't disagree with your results, but did you actually load and play some games? Synthetic scores and real-world usage don't always jibe. I typically get around 2.5 hours of battery life out of this thing under heavy web browsing using wireless, so I'm not sure how you got such poor results for battery life, either—especially with a lower-power processor. Battery life is even better when I'm more miserly with the power.

—Chad Greiner

Associate Editor David Murphy Responds: We chose the Asus F8Sn because it fit the price point for our mainstream laptop category (approximately $1,100). While we certainly could have picked a stronger Asus laptop to review, that would have bumped the device into the professional category, which is where one would typically find a laptop with specs as beefy as those in your machine.

For battery tests, we set a laptop's screen brightness to medium and then fire up a full-screen DVD movie. In this test, the Asus F8Sn severely underperformed compared to the other mainstream laptops we tested. Battery life varies depending on how you use your laptop, but our benchmark is a replicable, and real-world estimate of laptop battery prowess.

The Truth about Tablets

I love the magazine. However, one thing I've

PHOTO OF THE MONTH

It was Either This or a Woman in Her Gaming Basement

Last month, Caleb Hodgson's photo of two cats snuggling under a printer didn't quite make the cut. This month he upped the ante with the same printer but a more exotic species.

To enter, send your tech-related high-res digital photo to comments@maximumpc.com.

never seen reviewed are Tablet PCs. I hear that they're the future of mobile computing, so I'm wondering why you haven't reviewed one in the magazine.

—Noel Puthenveetil

Editor in Chief Will Smith Responds: For a brief, glorious time in the early days of the millennium it looked like the Tablet PC was poised to change the face of computing. We reviewed a handful of early models and liked them despite their flaws. Unfortunately, vendors haven't been able to make them affordable. The machines are invariably underpowered business-class laptops that just don't fit well in *Maximum PC*.

I WOULDN'T TRUST MAVERICK TO PICK UP LUNCH FOR ME AT SUBWAY.

Your Plus is Our Minus

I like how *Maximum PC* labels the pro and con views on products. I loved the Rock Band/Garage Band, Ferrari/Pinto, and other verdicts, but I think you missed the mark a few times in the August issue.

On page 80 you started a review with the infamous catchphrase from *Top Gun* ("Tower, this is Ghostrider...."). In the verdict box, the plus was Goose and the minus Maverick. Maybe the person who assigned the monikers never saw *Top Gun*, but I would hardly use the comic relief as the plus and the kick-ass pilot as the minus. Maybe they should be switched?

For your review of Mass Effect, the plus was Deep Space Nine and the minus Terok Nor. They are, in fact, one in the same, just different names depending on who is talking about the space station. Perhaps the minus should have been Skylab?

There are others, but I just wanted to bring these up. They won't stop me from renewing my subscription though!

—Jeff Gillis

Senior Editor Gordon Mah Ung Responds: You're right. The minus probably should have been Empok Nor—unless, of course, you believe that from a Bajoran perspective that the Federation-run DS9 is better than the Cardassian-run Terok Nor. I stand by the other plus and minus. Who would you want backing you in a fight, Maverick or Goose? You know good ol' reliable Goose has your back, but I wouldn't trust Maverick to pick up lunch for me at Subway.

Bugged about Bloatware

This is the final straw. I already got tired of Vista bashing and OSX praise, but enough already. In the Apple vs. PC notebook feature (August 2008), you state that the XPS system comes up short in several performance tests. You also blatantly reveal that you kept the bundled CPU-sapping third-party applications installed on the machine! Dell is notorious for installing bloatware on its systems, while OSX doesn't come with anything installed—no antivirus, anti-spyware, or other apps. This is not a fair comparison. Compare a freshly installed OS and it's fair. I am extremely disappointed with your evaluation, which I think is very unprofessional.

—Hilmar Hoerner

Editor in Chief Will Smith Responds: While Apple has every opportunity to install crapware on your Windows partition when you install the Apple driver package, the company chooses not to. It seems that Dell cares more about getting a few bucks from its software partners than delivering a good-performing system to the customer.

We strongly encourage power users to remove the crapware that Dell and other vendors install on their PCs, but the vast majority of people who purchase these laptops leave the system as-is, not realizing that third-party apps can hurt performance. To measure the real-world end-user experience, we review the PCs as they are shipped to us, not as they *should be* shipped to us.

Reliving the Past

I've been a die-hard reader of your magazine since the middle of 2006. In one of your issues, you mentioned that it was possible to download back issues. So I downloaded a PDF copy of each magazine all the way back to December 2005. Is it possible to get copies of the CD-ROMs that came with the magazines, as well?

—Phillip Ballard

Deputy Editor Katherine Stevenson Responds: We're glad you're taking advantage of our back catalog! In time, we expect to have PDFs of all our issues as far back as 2001, and possibly earlier. Our CD-ROMs, on the other hand, are not archived—you'll have to make due with the discs you've received since becoming a subscriber.

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN

MAXIMUM PC'S WHAT'S IN YOUR CANDY BOWL?

OCT ISSUE

What Went Wrong with Windows Vista?

We go deep inside Microsoft HQ to find out exactly what went wrong with Vista and what Microsoft is doing to ensure it doesn't make the same mistakes with Windows 7.

Casual Games

We dropped this story to bring you breaking news on ATI's new videocards, but next month we're really going to bring you a full report on our favorite tiny timewasters, just in time for Friday afternoon.

Massive Monitor Roundup

We test a ton of 22- and 24-inch LCD panels to separate the beauties from the beasts. What panel should you spend your hard-earned cash on?

Win [redacted]e Month

IF YOUR MODDED PC IS CHOSEN AS A RIG OF THE MONTH, IT WILL:

2 Win you a $250 gift certificate

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to **rigf@maximumpc.com.** Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) the contest ends, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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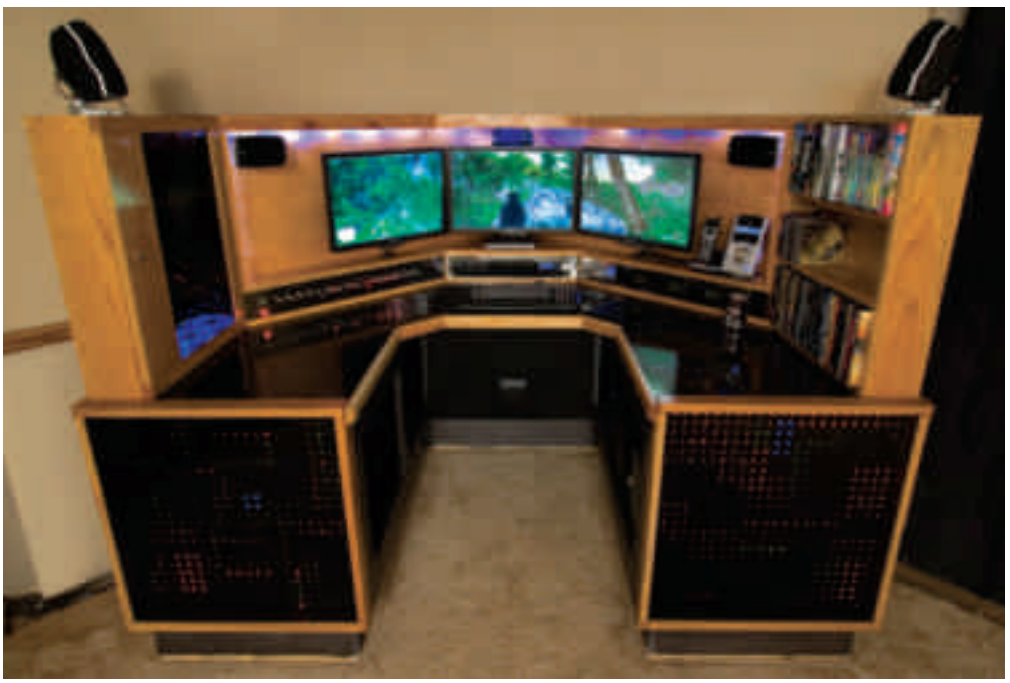
ENVELOPING Seizure

A man needs a place of his own, and when Thom Davis found using the family computer for his gaming pursuits to be less than ideal, he set about building the Seizure, the ultimate form-follows-function gaming rig. His goal was to create a rig that was gaming friendly, had no exposed wires, and looked good in the living room. We think he succeeded on all three counts.

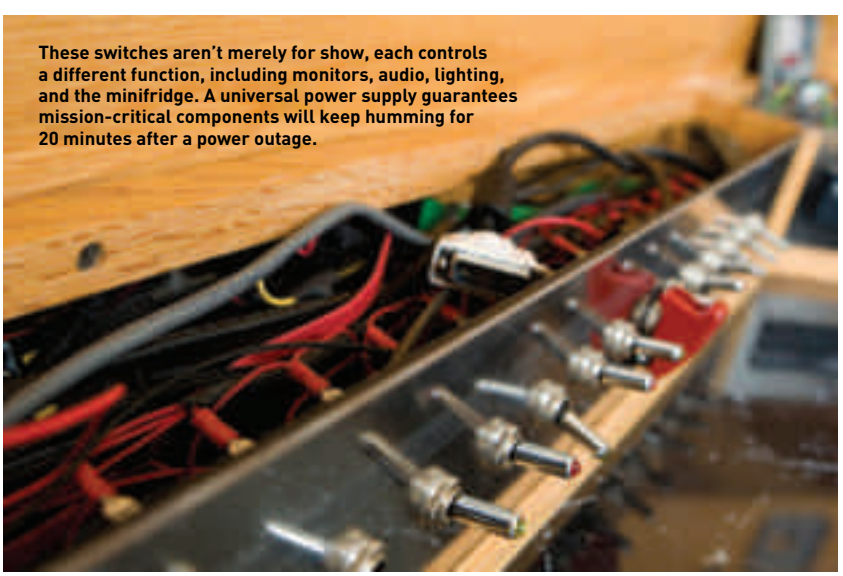
While building the Seizure, Thom discovered that connector manufacturers definitely tend to think "inside the box," and typically don't make cables suitable for such a large rig, but with the assistance of a local electronics supply store, he was able to create the 6-foot cables he needed to complete the job.



The two front LED panels were inspired by ROC, the computer featured in *Airplane II*.

BE A WINNER!

For submitting this month's winning entry, Thom has won a $250 gift certificate. To enter the Rig of the Month contest, see the official rules on page 100.



These switches aren't merely for show, each controls a different function, including monitors, audio, lighting, and the minifridge. A universal power supply guarantees mission-critical components will keep humming for 20 minutes after a power outage.

Thom and his wife spent many a night hot-gluing1,500 LEDs to the front panels—nothing spells romance like a little candlelight, a bottle of wine, and a glue gun!

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